DOCUMENT RESUME

ED 453 094 SO 032 567

AUTHOR	Ryan, Chris; Gunderson, Kari; Davis, Pam
TITLE	The Wilderness & Land Ethic Curriculum. Ninth through Twelfth Grade. First Edition.
INSTITUTION	Arthur Carhart National Wilderness Training Center, Missoula, MT.
PUB DATE	1999-00-00
NOTE	471p.; For a related curriculum for grades K-8, see SO 032 568.
AVAILABLE FROM	Arthur Carhart National Wilderness Training Center, 32 Campus Drive, Missoula, MT 59812-1900; Tel: 406-243-4682; Fax: 406-243-4717; Web site: http://www.wilderness.net/carhart/.
PUB TYPE	Guides - Classroom - Teacher (052)
EDRS PRICE	MF01/PC19 Plus Postage.
DESCRIPTORS	Conservation Education; Cultural Context; *Ecology; Environmental Education; High Schools; *Interdisciplinary Approach; *Land Use; *Natural Resources; Outdoor Education; Social Studies; *Wilderness
IDENTIFIERS	Historical Background; Land Treatment; Wilderness Act 1964

ABSTRACT

This Wilderness Curriculum is designed to provide classroom teachers, land managers, and outdoor educators with an interactive resource to promote awareness and appreciation of the cultural, environmental, and experiential values of wilderness. The curriculum is divided into a "Wilderness: An Overview" section, a "Leave No Trace/Field Experience" section, and then six subject matter sections: "Social Studies"; "American History"; "English"; "The Arts"; "Science"; and "Math." The overview offers a concise orientation to what wilderness is all about. Subsequent sections contain a variety of lessons and activities that provide objectives, background information, materials needed, and procedures. Many activities include reproducible student handouts. The curriculum includes a glossary, suggested background reading materials, and a list of materials needed for the activities. (BT)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 453 094

the WILDERNESS & LAND ETHIC CURRICULUM

SO 032 567

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☒ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

NINTH THROUGH TWELFTH GRADE

FIRST EDITION

Arthur Carhart National Wilderness Training Center

BEST COPY AVAILABLE

Arthur Carhart National Wilderness
Training Center

"Fostering interagency excellence in wilderness stewardship"

The Wilderness & Land Ethic Curriculum

Ninth Through Twelfth Grade

Arthur Carhart National
Wilderness Training Center
32 Campus Drive
Missoula, Montana 59812-1900

Telephone: (406) 243-4682
FAX - (406) 243-4717
http://www.wilderness.net/carhart/

1999

The Carhart Wilderness Training Center is a United States federal government inter-agency training center devoted to training federal and state land managers who have wilderness management responsibilities; however, we have also developed school curricula on wilderness for primary and secondary education levels. Our staff are representatives from the 4 federal wilderness land managing agencies, which are the Bureau of Land Management, the National Park Service, the U.S. Fish and Wildlife Service and the U.S. Forest Service.

TABLE OF CONTENTS

FOREWORD i

INTRODUCTION ii

WILDERNESS: AN OVERVIEW 1

LEAVE NO TRACE FIELDEXPERIENCE 31

Lesson 1: The Best Trip is Well Planned!
  Activity 1: Are You Ready?
  Activity 2: Will You Make It?
  Activity 3: Developing a "Total Food Planning" List
  Activity 4: The Skills Trail
Lesson 2: A Wilderness Backpacking Trip
  Activity 1: Planning a Wilderness Backpacking Trip
  Activity 2: Activities for a Backpacking Trip
Lesson 3: Reflections on Wild Places-A Journal-Making Activity
  Activity 1: Setting the Stage
  Activity 2: Journaling Layers of the Landscape

SOCIAL STUDIES

American Government 75
Lesson 1: Who Manages Wilderness?
  Activity 1: Legislation and Management

American Government; Geography 79
Lesson 2: National Wilderness Preservation System, Geographic Locations
  Activity 1: National Wilderness Preservation System

Communication Arts: English; Speech/Debate 82
Lesson 3: Fact vs. Opinion
  Activity 1: Opposing Viewpoints
  Activity 2: We Can't Always Believe What We Read!
Lesson 4: Wilderness Issues: Community Attitude Survey
  Activity 1: Wilderness Issues: Community Attitude Survey

Communication Arts: English; Speech Debate; Stewardship 97
Lesson 5: Wilderness Management Case Studies
  Activity 1: Wilderness Management Scenarios

Historical/Cultural Perspectives 108
Lesson 6: Celebrating Our Diversity Through Wilderness
  Activity 1: Visions of the Wild
  Activity 2: All Things are Connected

TABLE OF CONTENTS

SOCIAL STUDIES (cont.)

American Government/History Connections 111
Lesson 7: The Wildlands Proposal - Mapping Out Future Living Space
  Activity 1: Mapping a Regional Wilderness Recovery Network for a Local Area
Lesson 8: Wilderness: Human Uses, Past and Present
  Activity 1: Wilderness: Human Uses, Past and Present
Lesson 9: Recognizing Recreational Benefits of Wilderness
  Activity 1: Wilderness Carrying Capacity
  Activity 2: Plan a Trip
  Activity 3: Wilderness Value Questions to Ponder
  Activity 4: Observing Ecological Processes on the Landscape

Careers Information for Counselors 129
Lesson 10: Wilderness Careers
  Activity 1: Wilderness Career Opportunities
  Activity 2: Early Day Rangers

Leadership Skills 137
Lesson 11: Perspectives on Leadership
  Activity 1: Qualities of an Outdoor Leader
  Activity 2: Developing GOOD Judgement
  Activity 3: Leadership Traits

American Government; CommunicationArts; Peer Tutoring 146
Lesson 12: Protecting Open Space
  Activity 1: Protecting Open for Wildlife
Lesson 13: Life-style and Wilderness (Issues & Action Practicum)
  Activity 1: Life-style and Wilderness
Lesson 14: Teaching a Wilderness Lesson (Teaching Practicum)

AMERICAN HISTORY -

American Government 176
Lesson 1: What is Wilderness?
  Activity 1: What is Wilderness?
  Activity 2: Citizen Action: the Wilderness Act

Lesson 2: Environmental Policy History
  Activity 1: The American Experience: Battle for Wilderness
  Activity 2: Muir and Pinchot Today
  Activity 3: Wilderness Timeline

TABLE OF CONTENTS
AMERICAN HISTORY

Lesson 3: Historical Photographs
  Activity 1: A Wild Image Frozen in Time
Lesson 4: Traditional Tools
  Activity 1: Traditional Tools
Lesson 5: Minimum Tools
  Activity 1: Minimum Tools
Lesson 6: Wilderness Literature
  Activity 1: The Power of Literature

Perspectives; Literature 215
Lesson 7: Historical and Cultural Perceptions of Wilderness
  Activity 1: A Letter too Late
  Activity 2: Interacting on the Frontier
Lesson 8: The Wilderness Commons
  Activity 1: Tragedy of the Commons
  Activity 2: The Place, the Region, and the Commons
  Activity 3: The Commons Dilemma
  Activity 4: The Wilderness Experience

Communication Arts; Research 225
Lesson 9: Wilderness Heroes & Heroines
  Activity 1: Wilderness Heroes & Heroines

American Government, Communication Arts, Speech/Debate Connections 233
Lesson 10: Prohibitions and Conflicting Uses in Wilderness
  Activity 1: Prohibitions and Conflicting Uses in Wilderness
  Activity 2: Summing It All Up, What Do You Think?
  Activity 3: Mechanized Mountain Biking

Stewardship, Communication Arts, Speech/Debate 243
Lesson 11: Wilderness: A Way of Life
  Activity 1: All things are Connected
  Activity 2: Native American Storytelling
Lesson 12: Looking Into the Future
  Activity 1: Wilderness Management Dilemma

ENGLISH

American Government 252
Lesson 1: Rewriting the Wilderness Act
  Activity 1: Rewriting the Wilderness Act

TABLE OF CONTENTS
ENGLISH (cont.)

Literature: American History **259**
Lesson 2: Wilderness Literature
  Activity 1: The Power of Literature
  Activity 2: Freedom and Wilderness
  Activity 3: The Etiquette of Freedom

Research 266
Lesson 3: Contemporary Role Models in Wilderness & Land Ethics
  Activity 1: Contemporary Role Models in Wilderness & Land Ethics

Aesthetics; Creative Writing 270
Lesson 4: Reflections on Wild Places - A Journal-Making Activity
  Activity 1: Setting the Stage
  Activity 2: Journaling - Layers of the Landscape

Literature Perspectives 275
Lesson 5: Story: Communicating Experience
  Activity 1: Parts of a Story
  Activity 2: Landscape and Narrative
Lesson 6: Perceptions of the Wild
  Activity 1: Perceptions of the Wild

Literature Connections 283
Lesson 7: Wilderness Connections
  Activity 1: Connecting With Wilderness

THE ARTS

Aesthetics/Visual Arts **289**
Lesson 1: The Art of Wild Places
  Activity 1: The Art of Wild Places
  Activity 2: Wilderness and the Imagination
Dance/Movement/Music **292**
Lesson 2: Wilderness and Performing Arts
  Activity 1: Story Without Words
  Activity 2: Do You Hear What I Hear?
Lesson 3: Spaces and Places: Human Environments and Wilderness
  Activity 1: Aimless Wandering
  Activity 2: The Grid
  Activity 3: Arcing

TABLE OF CONTENTS
THE ARTS (cont.)

Visual Arts Perspectives 304
Lesson 4: Historical Photographs
  Activity 1: A Wild Image Frozen in Time
Lesson 5: Landscape Artists and Photographers
  Activity 1: Landscape Artists and Photographers
Lesson 6: Photography
  Activity 1: Photos Keep It Happening!

Communication Arts; Media Literacy Connection. 312
Lesson 7: "Oooh You Wild Thang" - Wild Places Used in Making the Pitch
  Activity 1: Advertisement Collection
  Activity 2: Simulation Discussion

SCIENCE

Biology 323
Lesson 1: Wilderness Ecosystems
  Activity 1: A Journey Through the National Wilderness Preservation System

Biology; Research 327
Lesson 2: Wilderness Research
  Activity 1: Wilderness Research

Biology Connections 333
Lesson 3: Noxious Weeds - What Can I Do?
  Activity 1: Who Lives Here?
  Activity 2: Weed Management Field Trip
Lesson 4: Endangered Species
  Activity 1: Endangered Species

Ecology; Earth Science; Geology 353
Lesson 5: Geology: Shaping Landscapes
  Activity 1: Identifying Landforms
  Activity 2: Natural Landforms, What Relief!
  Activity 3: Branching out: Take a Look at Landforms
  Activity 4: Geology of Wild Places
Lesson 6: A Source of Fresh Water - Wilderness Watersheds
  Activity 1: Map Symbols Bingo
  Activity 2: Reading the Land Contours!
  Activity 3: Mapping a Watershed
Lesson 7: Air Quality
  Activity 1: Payne's World
  Activity 2: Air Strips

TABLE OF CONTENTS

SCIENCE (cont.)

Stewardship; Ecology; American Government 389
Lesson 8: Connecting to Our Natural World
  Activity 1: Wildland Designation
  Activity 2: Values and Benefits of Wilderness
  Activity 3: Making the Connection

MATH

Geography 405
Lesson 1: Wilderness Happenings - What the Numbers Tell Us
  Activity 1: Where is Wilderness
  Activity 2: Growth of National Wilderness Preservation System
  Activity 3: Alaska

Ecology; Biology 416
Lesson 2: Carrying Capacity: What is a Viable Population? A Lesson on Numbers and Space
  Activity 1: Do You Have Enough Space for Those Animals?

Stewardship; Resource Conservation 422
Lesson 3: Energy Consumption and Wilderness
  Activity 1: Renewable Energy Research and Development
  Activity 2: Flip the Switch for Wildlife

READINGS AND REFERENCES 429

GLOSSARY OF TERMS 435

APPENDICES 441

Foreword

Judging by the inquiries we've received from teachers, wilderness managers, and the public, the arrival of this first edition of the Wilderness and Land Ethic Curriculum for grades 9 through 12 is nearly a blessed event, not just for us, but for the community that values wilderness. We recognize that what you have before you has taken many months to appear, partly as a result of its complexity, and partly because of our desire to make it the best possible tool. Well, here you have it.

If you find errors in the text, just let us know so we can fix them in subsequent versions. Likewise, we will be looking for better ways to get this curriculum into the hands that need it most. And remember, the most recent edition of this document will always be on the Web at www.wilderness.net.

There are many, many selfless people who contributed to this finished product. Those that first come to mind are Chris Ryan (at the Carhart Center) who shepherded this curriculum through the labyrinths of its creation; Kari Gunderson, who envisioned the final product and developed much of the content; and Pam Davis, curriculum development specialist, who helped make it a most compelling and functional document.

Lessons were pilot tested by teachers in their classrooms, throughout the country, and their feedback is woven into nearly every page. Heartfelt thanks go to those many teachers. Several federal employees acted as regional coordinators for pilot testing: Barb Miranda, Mark De Greggorio, Alice Cohen, Marcia Heymen, Patrick Lancaster, Susan Sater, Greg Hansen, and Rol Hesselbart. After such a long wait for the final product, they will probably be relieved and even surprised to finally see the fruit of their labor. Special thanks go to Laurie Kreis at the Carhart Center for help with text revisions and pilot test distribution. Thanks as well to Dave Cornell, whose computer magic and quiet patience translated seemingly indecipherable margin notes into a coherent and legible product.

Thanks should really go out in concentric circles, like spreading ripples on water, to more and more people who in some way contributed to this project. But this foreword is long enough, and I earnestly hope you all know who you are and can recognize and value your contributions. The German philosopher Goethe wrote that we are shaped and fashioned by what we love. You have all been shaped and fashioned by your passion for wilderness, and this curriculum you are holding in your hands today has been shaped and fashioned by you as well. Thank you.

Connie G. Myers
Director
Arthur Carhart National Wilderness Training Center

Missoula, Montana
April 1999

Introduction

WELCOME TO THE 9TH THROUGH 12TH GRADE WILDERNESS CURRICULUM!

The National Wilderness Preservation System, totaling approximately 104 million acres and consisting of 630 individual Wilderness units, is under the jurisdiction of four land management agencies: three in the Department of Interior and one in the Department of Agriculture. The National Wilderness Preservation System was established with the passage of the Wilderness Act in 1964. The Wilderness Act begins with these prophetic words:

> *In order to assure that an increasing population, accompanied by an expanding settlement and growing mechanization, does not occupy and modify all areas of the United States... leaving no lands designated for preservation and protection in their natural condition, it is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefit of an enduring resource of wilderness.*

Wilderness or wilderness?

In this curriculum we have used wilderness and Wilderness throughout the text. We have distinguished between the two by using wilderness to denote the concept of wilderness, wild lands, and wild places. When Wilderness is used, it refers to federal lands that have been protected under law by Congress as designated Wilderness. These lands are included in the National Wilderness Preservation System, managed by the Forest Service, National Park Service, Bureau of Land Management, and the Fish and Wildlife Service.

HOW THIS CURRICULUM IS ORGANIZED

This Wilderness Curriculum is designed to provide classroom teachers, land managers and outdoor educators with an interactive resource to promote awareness and appreciation of the cultural, environmental, and experiential values of wilderness.

This curriculum is divided into a *Wilderness: An Overview* section, a *Leave No Trace/ Field Experience* section, and then six subject matter sections: *Social Studies, American History, English, The Arts, Science,* and *Math*. We recommend that you first peruse *Wilderness: An Overview* for a concise orientation to what wilderness is all about, then take a look at the array of lessons and activities that pertain to your area of emphasis. Please keep in mind that lessons of interest to you may be found under more than one subject area.

Following the lessons and activities, you will find a glossary of terms, suggested background reading materials, and a listing of components that make up the complete 9th - 12th grade Wilderness Box.

The Wilderness Box is a collection of most of the materials you will need to carry out any of the activities in this curriculum. The Box is an excellent resource for a school or school district, providing teachers of different subject areas easy access to the tools they need to teach the lessons. **Materials included in the box are referenced by a 🐆.** But please keep in mind that you *do not* have to have the Box to be able to utilize this curriculum. You should be able to easily obtain supporting materials for any of the activities locally; we have also included a list of vendors of the specific Box components at the end of this curriculum. We encourage you to adapt the lessons to your own settings and needs.

This curriculum is accompanied by *The Wilderness Reader*, which contains the texts of most of the readings referred to in the lessons. The *Reader* can also stand alone as a delightful collection of essays that will inspire you and deepen your understanding and appreciation of wilderness.

PHILOSOPHY

"In the end
we will conserve only what we love,
we will love only what we understand,
and we will understand
only what we are taught."
-- Baba Bioum

Wilderness is a teacher. Wilderness areas are living classrooms from which knowledge about ourselves and our world are lessons, waiting to be learned. The best way to learn about wilderness is to go there. First-hand field experiences are exponentially more powerful than second-hand classroom experiences. Getting out of the boxed-in walls of a classroom into the three-dimensional world of wilderness will instill in students a desire to learn more about wilderness, making the classroom lessons much more powerful. This will lead to an appreciation of wilderness and a desire to act as good stewards of our wilderness areas.

For this reason, the field experience portion of the Wilderness and Land Ethic Curriculum precedes classroom experiences. Every effort should be made to arrange field trips to places where students can see, hear, smell, taste, and feel the natural wonders of our world.

NATIONAL SCIENCE EDUCATION STANDARDS

The National Science Education Standards were published in 1996 by the National Research Council. The National Science Teachers Association along with the National Academy of Sciences and other groups support this document that was designed to enable all students in the nation to achieve the goal of becoming scientifically literate.

Connections between the Standards and the Wilderness and Land Ethic Curriculum include:

Identify and Use Resources Outside the School:
"The school science program must extend beyond the walls of the school to the resources of the community... The physical environment in and around the school can be used as a living laboratory for the study of natural phenomena."

Connect to Other School Subjects:
"Student achievement in science and in other school subjects such as social studies, language arts, and technology is enhanced by coordination between and among the science program and other programs... As an example, the National Standards for Geography include knowledge about land forms, as do the earth and space science standards. A combined geography and science unit is natural."

INTRODUCTION

Good Science Programs Require Access to the World Beyond the Classroom:
"District and school leaders must allocate financial support to provide opportunities for students to investigate the world outside the classroom. This may mean budgeting for trips to nearby points of interest such as a river, archaeological site, or nature preserve."

Excerpted from: *The National Science Education Standards*, National Academy Press, 2101 Constitution Avenue, NW, Box 285, Washington, DC 20055; copyright 1996.

NOW IT'S UP TO YOU!

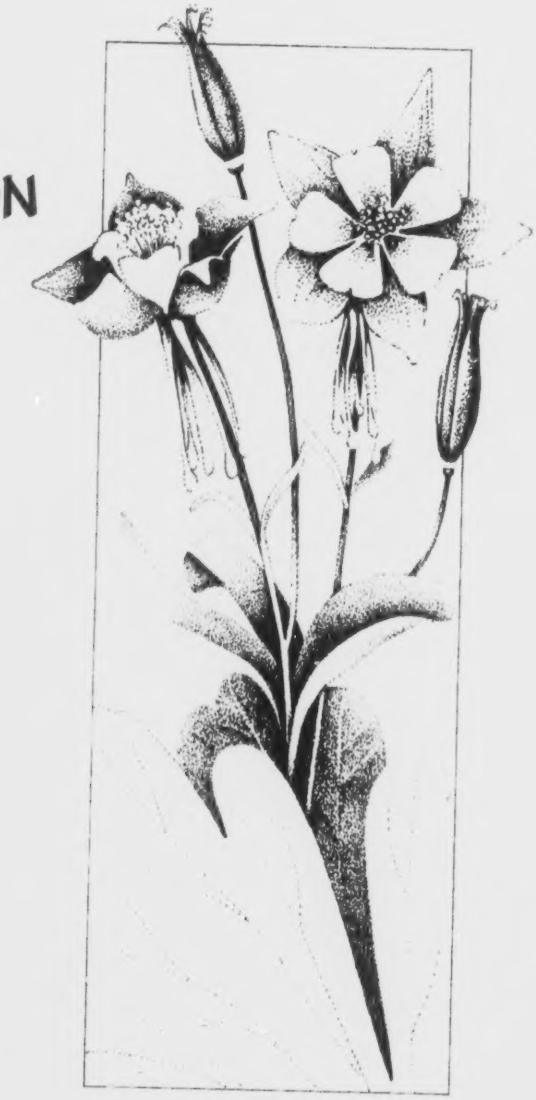
We've done our best to provide you with an interactive, compelling, and fun curriculum.
The rest is up to you! We look forward to your feedback.

Arthur Carhart National Wilderness Training Center
20325 Remount Rd.
Huson, MT 59846
(406) 626-5208

WILDERNESS: AN OVERVIEW

TABLE OF CONTENTS

FOREWORD
INTRODUCTION



WILDERNESS: AN OVERVIEW

Wilderness: An Overview 3

Why Wilderness 5

Wilderness a Brief History 9

National Wilderness Preservation System 12

National Wilderness Preservation System Fact Sheet 13

Laws Affecting Wilderness Management 14

Land Classifications Related to Wilderness 17

Wilderness-Related Career Options 19

National Wilderness Preservation System Data 20

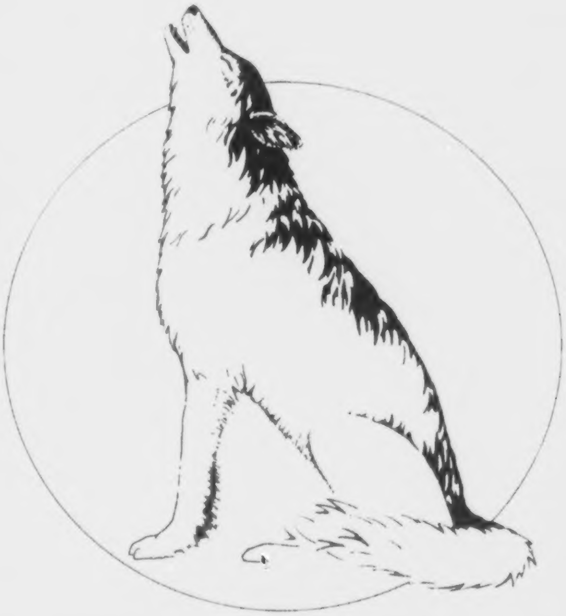
Wilderness Act 46

WILDERNESS: AN OVERVIEW

The most frequently asked questions about this thing called wilderness:

What Is Wilderness?

Wilderness is a place where the imprint of humans is substantially unnoticed. It is where natural processes are the primary influences and human activity is limited to primitive recreation and minimum tools. This allows us to experience wild places without intention to disturb or destroy natural processes. Change will occur primarily through natural disturbance and minimum human influence.



Is It A Law?

YES. In 1964 the Congress of the United States passed the Wilderness Act, restricting grazing, mining, timber cutting and mechanized vehicles in these areas. They are protected and valued for their ecological, historical, scientific and experiential resources. The law protects these values for future generations.

Who Manages Wilderness?

The National Wilderness Preservation System is managed by the National Park Service, Forest Service, Fish and Wildlife Service and the Bureau of Land Management. Wilderness, designated by Congress, is one layer of protection, placed on top of original federal land designation.

Although federal agencies are legally responsible for managing Wilderness areas, all citizens have a role and responsibility. As visitors, your behaviors and actions should be appropriate. As citizens, we should be aware of the impacts of our lifestyles on our country's wild lands.

Why do we have to manage a Wilderness?

Wilderness management is essentially the regulation of human use and influence in order to preserve the quality, character and integrity of these protected lands. We all must be aware of our impacts. As individuals our choices and consumption of resources may in some way degrade wilderness values such as ecological health, solitude and aesthetics.

We are managing for future generations, committing to having places that remain undisturbed for centuries, not just decades. In order to keep Wilderness wild, we need to ensure that our social and individual practices, both inside the Wilderness and outside, do not cause changes that will erode the resource.

What are the threats to Wilderness?

There are many issues in Wilderness. What is a minimum tool? What is primitive? What is Wilderness character and integrity? What is solitude? How do we manage threats, like air pollution, that are outside Wilderness? In many cases, societal pressures have the most significant effect upon wildland resources. Resource managers are discovering the significant connection between society and Wilderness. For instance, pollution sources in cities can disturb plant and aquatic life in seemingly distant and separate Wilderness lands.

The ecological as well as recreational values of Wilderness must be maintained in preserving Wilderness. With economic growth exerting pressures of a growing population, agencies are observing many of these potential threats to the Wilderness resources including:

- Loss of character, quality and integrity of Wilderness;
- Loss of or threats to biological/ecological processes and biodiversity, through human disturbance;
- Soil compaction, vegetation loss or disturbance and replacement by non-native species such as noxious weeds, on trails and campsites caused by heavy recreation use;
- Crowding, loss of solitude;
- Deterioration of water quality from improper disposal of human waste and waste water;
- Air pollution from outside sources;
- Interruption of natural functioning ecosystems by fire suppression;
- Threats to native plant species from the spread of noxious weeds from sources outside Wilderness.

So What Can I Do?

Everyone has a role in protecting and managing Wilderness. Through your vote, your lifestyle and your actions while visiting Wilderness, you can help reduce these threats to wild areas. Contact your local Forest Service Ranger District, Park headquarters, BLM Resource Area or Refuge Manager for more information.

WHY WILDERNESS?

Some thoughts about preservation...

The preservation of wild lands is uniquely American. Our first contact with the "new world" exposed us to the rich culture of the American Indians and their intimate knowledge of the natural world. Toward the end of the 19th century and the end of the frontier era, forward-looking individuals such as John Wesley Powell, John Muir and Gifford Pinchot contributed to a conservation of public lands. They and others recognized that resources were limited and settling the West, with an economic base of natural resources, required conservation practices. Arguments were made for the preservation of land for non-extractive purposes, and laws were passed that today leave us with a precious treasure of undisturbed wild lands.

Through recent history, Western European cultures and traditions have maintained a distinct separation between the land and our human existence. Many people are beginning to see the connections, beginning to see that we cannot separate ourselves from the land. Humans are a part of the natural world, not apart from it, and our style of living has effects upon the health of the bigger global environment.

The preservation of wild lands has many values. Recognizing these diverse and unique values opens a world of understanding about the natural world. Preserving Wilderness may someday be seen through eyes of historians as the most important contribution societies can make to the health of the global environment. Here are some of those values.
Together, they show how rare and valuable our wild lands are.

Reservoirs of Biological Diversity

"The outstanding scientific discovery of the twentieth century is not the television, or radio, but rather the complexity of the land organism. Only those who know the most about it can appreciate how little is known about it. "

—Aldo Leopold, *A Sand County Almanac* (1949)

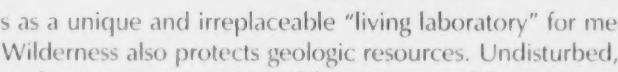
Wilderness is one part of the "land organism". Wilderness plays a significant role in the overall health of ecosystems. Rare and endangered plant and animal species require habitats that are relatively undisturbed so gene pools can be sustained, adaptations made, and populations maintained. Many rare and endangered species are indicators of ecological health, or they may play key roles in the balance of the ecosystem. Natural disturbance, like floods or fires, maintain natural processes, systems, and patterns. Few places are left where rivers flood and trees are allowed to burn in natural cycles. Wildness is the heart of the "land organism".

Scientific Value

Wilderness serves as a unique and irreplaceable "living laboratory" for medicinal and scientific research. Wilderness also protects geologic resources. Undisturbed, naturally occurring geologic phenomena are protected for present and future generations so they may pursue the origin of this planet and the universe.

Watersheds

Many Wildernesses are the headwaters of our rivers and water systems. These watersheds provide sources of clean water. Minimal human activity or development in these areas preserves waters for future generations. Without clean water, societies cannot flourish. The connection between our Wildernesses and our cities is most evident with water, our basic resource.



Life Support Systems

Wilderness serves as critical habitat for animal and plant life. Wilderness maintains gene pools to provide diversity of plants and animal life. Today, as we learn more about the greenhouse effect and the depletion of the ozone layer, more and more people realize that humanity is part of an interconnected "web of life," and that the survival of our own species may ultimately depend on the survival of natural areas.

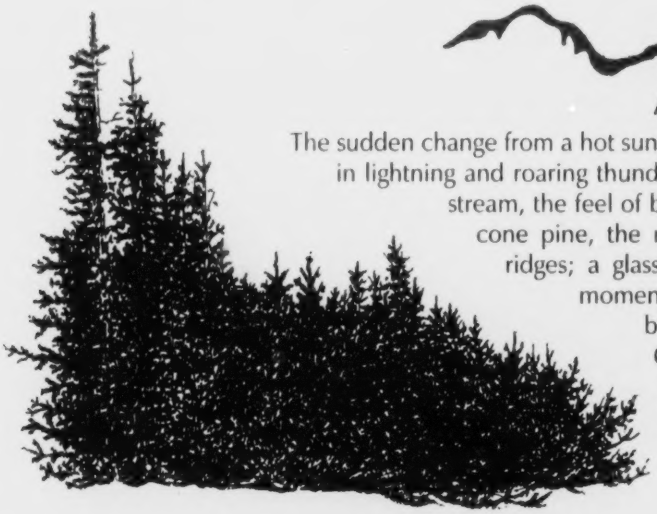
Historic and Cultural Values

Wilderness is a unique repository for cultural resource. Artifacts and structures protected by the Archeological Resources Protection Act or other laws take on a new perspective when experienced within the context of the Wilderness. These features tell a valuable story about the human relationship with wildlands.

In addition, culture has been defined by wilderness. Our American values of freedom, ingenuity and independence have been affected by the wild environments from which we created societies. Wildness has been a part of America since its beginnings. For this reason, Americans have a special attraction to wildness.

Spiritual Values

The spirit of the land can be understood through the Judeo-Christian tradition, the Zen, the Buddhist or simply an individual's connections through experience. These wild lands offer opportunities for reflection, for observation, for explorations of the ideas and experiences that can only be found in our wild areas. They have become churches of sorts, for our personal growth and our understanding of the relations between humans and the land.

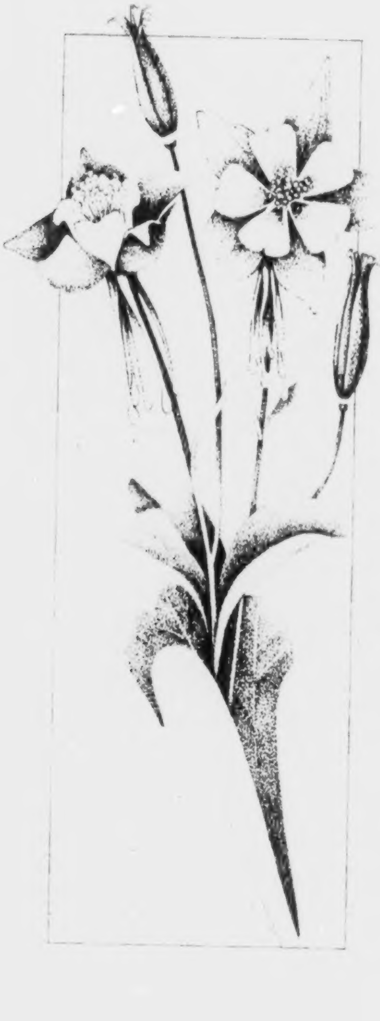


Aesthetic Values

The sudden change from a hot sunny day to a powerful storm exploding in lightning and roaring thunder, the delightful sound of a trickling stream, the feel of bark from a thousand year old Bristlecone pine, the morning light beaming on cliffs and ridges; a glassy lake reflecting a peak. These are moments we cherish, whether seen in picture books or movies or with our own eyes. Call it beauty. Humans are enchanted by nature. We are not in control. We are participants. This is the aesthetic of Wilderness that has a special value.

Recreation

Many people enjoy traveling in Wilderness areas for the challenge or the pure joy of such an experience. Values such as self reliance are particularly important. You are responsible for yourself. Your actions are of consequence. Lessons of the wild teach us something about being human and what our relationship to nature is all about.



Refuge

Wilderness serves as a haven from the pressure of our fast-paced industrial society. It is a place where we can seek relief from the noise and speed of machines, confines of steel and concrete, and the crowding of people.

Educational Values

Wilderness is a teacher. Wilderness areas are living classrooms from which knowledge about ourselves and our world are lessons, waiting to be learned.

* * *

"In Wildness is the preservation of the world."

–Henry David Thoreau

"In human culture is the preservation of wildness."

—Wendel Berry

NATIONAL WILDERNESS PRESERVATION SYSTEMS FACT SHEET

Agency	Units	Federal Acres (%)
Forest Service, USDA	398	34,751,592 (33.2)
National Park Service, USDI	44	43,917,068 (42.0)
Fish and Wildlife Service, USDI	71	20,686,134 (19.8)
Bureau of Land Management, USDI	131	5,216,550 (5.0)
GRAND TOTAL	624*	104,571,344 (100)

National Wilderness Preservation System (excluding Alaska):

Agency	Units	Federal Acres (%)
Forest Service, USDA	379	28,999,371 (62.5)
National Park Service, USDI	36	10,163,985 (21.9)
Fish and Wildlife Service, USDI	50	2,009,222 (4.3)
Bureau of Land Management, USDI	131	5,216,550 (11.3)
TOTAL	596	46,389,128 (100)

National Wilderness Preservation System (Alaska)

Agency	Units	Federal Acres (%)
Forest Service, USDA	19	5,752,221 (9.9)
National Park Service, USDI	8	33,753,083 (58.0)
Fish and Wildlife Service, USDI	21	18,676,912 (32.1)
TOTAL	48	58,182,216 (100)

NOTE: Detailed breakdowns by wilderness within each State and Agency jurisdiction can be found in the Annual Wilderness Report to Congress. Some acreage values are estimates, pending final mapping and surveys. Changes in acreage are not uncommon. For the most up-to-date statistics, contact one of the federal land managing agencies.

*Total number of units for all agencies is 624; this is not additive from information above because of overlapping responsibilities. Date prepared: 06/01/1998

NATIONAL WILDERNESS PRESERVATION SYSTEM

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
ALASKA				
Aleutian Islands	FWS	Alaska Maritime NWR	1,300,000	1980
Andreafsky	FWS	Yukon Delta NWR	1,300,000	1980
Becharof	FWS	Becharof NWR	400,000	1980
Bering Sea	FWS	Alaska Maritime NWR	81,340	1970
Bogoslof	FWS	Alaska Maritime NWR	175	1970
Chamisso	FWS	Alaska Maritime NWR	455	1975
Chuck River	FS	Tongass NF	74,298	1990
Coronation Island	FS	Tongass NF	19,232	1980
Denali	NPS	Denali NP	2,146,580	1980
Endicott River	FS	Tongass NF	98,729	1980
Forrester Island	FWS	Alaska Maritime NWR	2,832	1970
Gates of the Arctic	NPS	Gates of the Arctic NP	7,245,600	1980
Glacier Bay	NPS	Glacier Bay NP & Preserve	2,659,876	1980
Hazy Islands	FWS	Alaska Maritime NWR	32	1970
Innoko	FWS	Innoko NWR	1,240,000	1980
Izembek	FWS	Izembek NWR	300,000	1980
Karta River	FS	Tongass NF	39,889	1990
Katmai	NPS	Katmai NP & Preserve	3,425,811	1980
Kenai	FWS	Kenai NWR	1,350,592	1980
Kobuk Valley	NPS	Kobuk Valley NP	164,112	1980
Kootznoowoo	FS	Tongass NF	955,858	1980
Koyukuk	FWS	Koyukuk NWR	400,000	1980
Kuiu	FS	Tongass NF	60,581	1990
Lake Clark	NPS	Lake Clark NP	2,618,455	1980
Maurille Islands	FS	Tongass NF	4,937	1980
Misty Fjords National Monument	FS	Tongass NF	2,142,307	1980
Mollie Beattie	FWS	Arctic NWR	8,000,000	1980
Noatak	NPS	Noatak National Preserve	5,815,655	1980
Nunivak	FWS	Yukon Delta NWR	600,000	1980
Petersburg Creek-Duncan Salt Chuck	FS	Tongass NF	46,849	1980
Pleasant/Lemusurier/Inian Islands	FS	Tongass NF	23,096	1990

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
ALASKA (cont.)				
Russell Fjord	FS	Tongass NF	348,701	1980
Saint Lazaria	FWS	Alaska Maritime NWR	65	1970
Selawik	FWS	Selawik NWR	240,000	1980
Semidi	FWS	Alaska Maritime NWR	250,000	1980
Simeonof	FWS	Alaska Maritime NWR	25,855	1976
South Baranof	FS	Tongass NF	319,568	1980
South Etolin	FS	Tongass NF	82,619	1990
South Prince of Wales	FS	Tongass NF	90,968	1980
Stikine-LeConte	FS	Tongass NF	448,926	1980
Tebenkof Bay	FS	Tongass NF	66,812	1980
Togiak	FWS	Togiak NWR	2,270,000	1980
Tracy Arm-Fords Terror	FS	Tongass NF	653,179	1980
Tuxedni	FWS	Alaska Maritime NWR	5,566	1970
Unimak	FWS	Alaska Maritime NWR	910,000	1980
Warren Island	FS	Tongass NF	11,181	1980
West Chichagof-Yakobi	FS	Tongass NF	264,491	1980
Wrangell-St. Elias	NPS	Wrangell-St. Elias NP & P	9,676,994	1980
TOTAL 58,182,216				
ALABAMA				
Cheaha	FS	Talladega NF	7,245	1983
Sipsey	FS	William B. Bankhead NF	24,922	1975
TOTAL 32,167				
ARKANSAS				
Big Lake	FWS	Big Lake NWR	2,143	1976
Black Fork Mountain	FS	Ouachita NF	8,350	1984
Buffalo National River	NPS	Buffalo National River	34,933	1978
Caney Creek	FS	Ouachita NF	14,460	1975
Dry Creek	FS	Ouachita NF	6,310	1984
East Fork	FS	Ozark NF	10,688	1984
Flatside	FS	Ouachita NF	9,507	1984
Hurricane Creek	FS	Ozark NF	15,307	1984
Leatherwood	FS	Ozark NF	16,838	1984
Poteau Mountain	FS	Ouachita NF	11,299	1984

WILDERNESS: AN OVERVIEW

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
ARKANSAS (cont.)				
Richland Creek	FS	Ozark NF	11,801	1984
Upper Buffalo	FS	Ozark NF	12,018	1975
TOTAL 153,654				
ARIZONA				
Apache Creek	FS	Prescott NF	5,666	1984
Aravaipa Canyon	BLM	Safford Field Office	19,700	1984
Arrastra Mountain	BLM	Kingman Field Office	129,800	1990
Aubrey Peak	BLM	Kingman Field Office	15,400	1990
Baboquivari Peak	BLM	Tuscon Field Office	2,040	1990
Bear Wallow	FS	Apache-Sitgreaves NF	11,080	1984
Beaver Dam Mountains	BLM	Arizona Strip Field Office	15,000	1984
Big Horn Mountains	BLM	Phoenix Field Office	21,000	1990
Cabeza Prieta	FWS	Cabeza Prieta NWR	803,418	1990
Castle Creek	FS	Prescott NF	25,215	1984
Cedar Bench	FS	Prescott NF	14,950	1984
Chiricahua	FS	Coronado NF	87,700	1964
Chiricahua National Monument	NPS	Chiricahua NM	10,290	1976
Cottonwood Point	BLM	Arizona Strip Field Office	6,860	1984
Coyote Mountains	BLM	Tuscon Field Office	5,100	1990
Dos Cabezas Mountains	BLM	Safford Field Office	11,700	1990
Eagletail Mountains	BLM	Yuma Field Office	97,880	1990
East Cactus Plain	BLM	Lake Havasu Field Office	14,630	1990
Escudilla	FS	Apache-Sitgreaves NF	5,200	1984
Fishhooks	BLM	Safford Field Office	10,500	1990
Fossil Springs	FS	Coconino NF	22,149	1984
Four Peaks	FS	Tonto NF	61,074	1984
Galiuro	FS	Coronado NF	76,317	1964
Gibraltar Mountain	BLM	Lake Havasu Field Office	18,790	1990
Grand Wash Cliffs	BLM	Arizona Strip Field Office	37,030	1984
Granite Mountain	FS	Prescott NF	9,762	1984
Harcuvar Mountains	BLM	Lake Havasu Field Office	25,050	1990
Harquahala Mountains	BLM	Phoenix Field Office	22,880	1990
Hassayampa River Canyon	BLM	Phoenix Field Office	12,300	1990
Havasu	FWS	Havasu NWR	14,606	1990

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
ARIZONA (cont.)				
Hells Canyon	BLM	Phoenix Field Office	9,311	1990
Hellsgate	FS	Tonto NF	37,440	1984
Hummingbird Springs	BLM	Phoenix Field Office	31,200	1990
Imperial Refuge	FWS	Imperial NWR	9,220	1990
Juniper Mesa	FS	Prescott NF	7,406	1984
Kachina Peaks	FS	Coconino NF	18,616	1984
Kanab Creek	BLM	Arizona Strip Field Office	6,700	1964
Kanab Creek	FS	Kaibab NF	63,760	1964
Kendrick Mountain	FS	Coconino NF	1,510	1984
Kendrick Mountain	FS	Kaibab NF	5,000	1984
Kofa	FWS	Kofa NWR	516,200	1990
Mazatzal	FS	Coconino NF	4,275	1964
Mazatzal	FS	Tonto NF	248,115	1964
Miller Peak	FS	Coronado NF	20,228	1984
Mount Baldy	FS	Apache-Sitgreaves NF	7,079	1970
Mount Logan	BLM	Arizona Strip Field Office	14,650	1984
Mount Nutt	BLM	Kingman Field Office	27,960	1990
Mount Tipton	BLM	Kingman Field Office	31,320	1990
Mount Trumbull	BLM	Arizona Strip Field Office	7,880	1984
Mount Wilson	BLM	Kingman Field Office	23,900	1990
Mt. Wrightson	FS	Coronado NF	25,260	1984
Muggins Mountain	BLM	Yuma Field Office	7,674	1990
Munds Mountain	FS	Coconino NF	24,411	1984
Needle's Eye	BLM	Tuscon Field Office	8,760	1990
New Water Mountains	BLM	Yuma Field Office	24,600	1990
North Maricopa Mountains	BLM	Phoenix Field Office	63,200	1990
North Santa Teresa	BLM	Safford Field Office	5,800	1990
Organ Pipe Cactus	NPS	Organ Pipe Cactus NM	312,600	1978
Paiute	BLM	Arizona Strip Field Office	87,900	1984
Pajarita	FS	Coronado NF	7,553	1984
Paria Canyon-Vermilion Cliffs	BLM	Arizona Strip Field Office	89,400	1984
Peloncillo Mountains	BLM	Safford Field Office	19,440	1990
Petrified Forest National	NPS	Petrified Forest NP	50,260	1970
Pine Mountain	FS	Prescott NF	8,609	1972

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
ARIZONA (cont.)				
Pine Mountain	FS	Tonto NF	11,452	1972
Pusch Ridge	FS	Coronado NF	56,933	1978
Rawhide Mountains	BLM	Lake Havasu Field Office	38,470	1990
Red Rock-Secret Mountain	FS	Coconino NF	47,194	1984
Redfield Canyon	BLM	Safford Field Office	6,600	1990
Rincon Mountain	FS	Coronado NF	38,590	1984
Saddle Mountain	FS	Kaibab NF	40,539	1984
Saguaro	NPS	Saguaro NM	71,400	1976
Salome	FS	Tonto NF	18,531	1984
Salt River Canyon	FS	Tonto NF	32,101	1984
Santa Teresa	FS	Coronado NF	26,780	1984
Sierra Ancha	FS	Tonto NF	20,850	1964
Sierra Estrella	BLM	Phoenix Field Office	14,400	1990
Signal Mountain	BLM	Phoenix Field Office	13,350	1990
South Maricopa Mountains	BLM	Phoenix Field Office	60,100	1990
Strawberry Crater	FS	Coconino NF	10,743	1984
Superstition	FS	Tonto NF	159,757	1964
Swansea	BLM	Lake Havasu Field Office	16,400	1990
Sycamore Canyon	FS	Coconino NF	23,325	1972
Sycamore Canyon	FS	Kaibab NF	7,125	1972
Sycamore Canyon	FS	Prescott NF	25,487	1972
Table Top	BLM	Phoenix Field Office	34,400	1990
Tres Alamos	BLM	Kingman Field Office	8,300	1990
Trigo Mountain	BLM	Yuma Field Office	30,300	1990
Upper Burro Creek	BLM	Kingman Field Office	27,440	1990
Wabayuma Peak	BLM	Kingman Field Office	38,754	1990
Warm Springs	BLM	Kingman Field Office	112,400	1990
West Clear Creek	FS	Coconino NF	15,238	1984
Wet Beaver	FS	Coconino NF	6,155	1984
White Canyon	BLM	Tuscon Field Office	5,790	1990
Woodchute	FS	Prescott NF	5,833	1984
Woolsey Peak	BLM	Phoenix Field Office	64,000	1990
TOTAL 4,529,061				

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
CALIFORNIA				
Agua Tibia	FS	Cleveland NF	15,933	1975
Ansel Adams	FS	Inyo NF	78,775	1964
Ansel Adams	FS	Sierra NF	151,483	1964
Argus Range	BLM	California Desert District	74,890	1994
Big Maria Mountains	BLM	California Desert District	47,570	1994
Bigelow Cholla Garden	BLM	California Desert District	10,380	1994
Bighorn Mountain	BLM	California Desert District	26,685	1994
Bighorn Mountain	FS	San Bernardino NF	11,800	1994
Black Mountain	BLM	California Desert District	13,940	1994
Bright Star	BLM	California Desert District	9,520	1994
Bristol Mountains	BLM	California Desert District	68,515	1994
Bucks Lake	FS	Pumas NF	23,958	1984
Cadiz Dunes	BLM	California Desert District	39,740	1994
Caribou	FS	Lassen NF	20,546	1964
Carrizo Gorge	BLM	California Desert District	15,700	1994
Carson-Iceberg	FS	Stanislaus NF	77,993	1984
Carson-Iceberg	FS	Toiyabe NF	83,188	1984
Castle Crags	FS	Shasta-Trinity NF	8,627	1984
Chanchelulla	FS	Shasta-Trinity NF	8,200	1984
Chemehuevi Mountains	BLM	California Desert District	64,320	1994
Chimney Peak	BLM	California Desert District	13,700	1994
Chuckwalla Mountains	BLM	California Desert District	80,770	1994
Chumash	FS	Los Padres NF	38,150	1992
Cleghorn Lakes	BLM	California Desert District	33,980	1994
Clipper Mountain	BLM	California Desert District	26,000	1994
Coso Range	BLM	California Desert District	50,520	1994
Coyote Mountains	BLM	California Desert District	17,000	1990
Cucamonga	FS	Angeles NF	4,200	1964
Cucamonga	FS	San Bernardino NF	8,581	1964
Darwin Falls	BLM	California Desert District	8,600	1994
Dead Mountains	BLM	California Desert District	48,850	1994
Death Valley	NPS	Death Valley NP	3,128,028	1994
Desolation	FS	Eldorado NF	42,194	1969
Desolation	FS	Lake Tahoe Basin Management Unit	21,281	1969
Dick Smith	FS	Los Padres NF	67,800	1984

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
CALIFORNIA (cont.)				
Dinkey Lakes	FS	Sierra NF	30,000	1984
Domeland	BLM	California Desert District	36,300	1964
Domeland	FS	Sequoia NF	93,781	1964
El Paso Mountains	BLM	California Desert District	23,780	1994
Emigrant	FS	Stanislaus NF	112,277	1975
Farallon	FWS	Farallon NWR	141	1974
Fish Creek Mountains	BLM	California Desert District	25,940	1994
Funeral Mountains	BLM	California Desert District	28,110	1994
Garcia	FS	Los Padres NF	14,100	1992
Golden Trout	FS	Inyo NF	192,765	1978
Golden Trout	FS	Sequoia NF	110,746	1978
Golden Valley	BLM	California Desert District	37,700	1994
Granite Chief	FS	Tahoe NF	19,048	1984
Grass Valley	BLM	California Desert District	31,695	1994
Hauser	FS	Cleveland NF	7,547	1984
Havasu	FWS	Havasu NWR	3,195	1990
Hollow Hills	BLM	California Desert District	22,240	1994
Hoover	FS	Inyo NF	9,507	1964
Hoover	FS	Toiyabe NF	39,094	1964
Ibex	BLM	California Desert District	26,460	1994
Imperial Refuge	FWS	Imperial NWR	5,836	1990
Indian Pass	BLM	California Desert District	33,855	1994
Inyo Mountains	BLM	California Desert District	132,000	1994
Inyo Mountains	FS	Inyo NF	73,000	1994
Ishi	FS	Lassen NF	41,099	1984
Ishi	BLM	NORCAL District	240	1984
Jacumba	BLM	California Desert District	33,670	1994
Jennie Lakes	FS	Sequoia NF	10,289	1984
John Muir	FS	Inyo NF	228,336	1984
John Muir	FS	Sierra NF	351,957	1984
Joshua Tree	NPS	Joshua Tree NP	557,802	1976
Kaiser	FS	Sierra NF	22,700	1976
Kelso Dunes	BLM	California Desert District	129,580	1994
Kiavah	BLM	California Desert District	40,290	1994
Kiavah	FS	Sequoia NF	42,115	1994

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
CALIFORNIA (cont.)				
Kingston Range	BLM	California Desert District	209,608	1994
Lassen Volcanic	NPS	Lassen Volcanic NP	78,982	1972
Lava Beds	NPS	Lava Beds NM	27,970	1972
Little Chuckwalla Mountains	BLM	California Desert District	29,880	1994
Little Picacho	BLM	California Desert District	33,600	1994
Machesna Mountain	BLM	Bakersfield District	120	1984
Machesna Mountain	FS	Los Padres NF	19,760	1984
Malpais Mesa	BLM	California Desert District	32,360	1994
Manly Peak	BLM	California Desert District	16,105	1994
Marble Mountain	FS	Klamath NF	241,744	1978
Matilija	FS	Los Padres NF	29,600	1962
Mecca Hills	BLM	California Desert District	24,200	1994
Mesquite	BLM	California Desert District	47,330	1994
Mojave	NPS	Mojave National Preserve	695,200	1994
Mokelumne	FS	Eldorado NF	60,154	1964
Mokelumne	FS	Stanislaus NF	22,267	1964
Mokelumne	FS	Toiyabe NF	16,740	1964
Monarch	FS	Sequoia NF	24,152	1984
Monarch	FS	Sierra NF	20,744	1984
Mt. Shasta	FS	Shasta-Trinity NF	33,845	1984
Newberry Mountains	BLM	California Desert District	22,900	1994
Nopah Range	BLM	California Desert District	110,860	1994
North Algodones Dunes	BLM	California Desert District	32,240	1994
North Fork	FS	Six Rivers NF	7,999	1984
North Mesquite Mountains	BLM	California Desert District	25,540	1994
Old Woman Mountains	BLM	California Desert District	146,020	1994
Orocopia Mountains	BLM	California Desert District	40,735	1994
Owens Peak	BLM	California Desert District	74,060	1994
Pahrump Valley	BLM	California Desert District	74,800	1994
Palen/McCoy	BLM	California Desert District	270,629	1994
Palo Verde Mountains	BLM	California Desert District	32,310	1994
Phillip Burton	NPS	Point Reyes NSS	25,370	1976
Picacho Peak	BLM	California Desert District	7,700	1994
Pine Creek	FS	Cleveland NF	13,480	1984

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
CALIFORNIA (cont.)				
Pinnacles	NPS	Pinnacles NM	13,270	1976
Piper Mountain	BLM	California Desert District	72,575	1994
Piute Mountains	BLM	California Desert District	36,840	1994
Red Buttes	FS	Rogue River NF	16,150	1984
Resting Spring Range	BLM	California Desert District	78,868	1994
Rice Valley	BLM	California Desert District	40,820	1994
Riverside Mountains	BLM	California Desert District	22,380	1994
Rodman Mountains	BLM	California Desert District	27,690	1994
Russian	FS	Klamath NF	12,000	1984
Sacatar Trail	BLM	California Desert District	51,900	1994
Saddle Peak Hills	BLM	California Desert District	1,440	1994
San Gabriel	FS	Angeles NF	36,118	1968
San Gorgonio	BLM	California Desert District	37,980	1964
San Gorgonio	FS	San Bernardino NF	56,722	1964
San Jacinto	FS	San Bernardino NF	32,248	1964
San Mateo Canyon	FS	Cleveland NF	38,484	1984
San Rafael	FS	Los Padres NF	197,380	1968
Santa Lucia	BLM	Bakersfield District	1,733	1978
Santa Lucia	FS	Los Padres NF	18,679	1978
Santa Rosa	BLM	California Desert District	64,340	1984
Santa Rosa	FS	San Bernardino NF	13,787	1984
Sawtooth Mountains	BLM	California Desert District	35,080	1994
Sequoia-Kings Canyon	NPS	Sequoia-Kings Canyon NP	736,980	1984
Sespe	FS	Angeles NF	600	1992
Sespe	FS	Los Padres NF	219,100	1992
Sheep Mountain	FS	Angeles NF	39,482	1984
Sheep Mountain	FS	San Bernardino NF	2,401	1984
Sheephole Valley	BLM	California Desert District	174,800	1994
Silver Peak	FS	Los Padres NF	14,500	1992
Siskiyou	FS	Klamath NF	75,680	1984
Siskiyou	FS	Siskiyou NF	5,300	1984
Siskiyou	FS	Six Rivers NF	71,700	1984
Snow Mountain	FS	Mendocino NF	36,370	1984
South Nopah Range	BLM	California Desert District	16,780	1994
South Sierra	FS	Inyo NF	31,865	1984

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
CALIFORNIA (cont.)				
South Sierra	FS	Sequoia NF	28,219	1984
South Warner	FS	Modoc NF	70,614	1964
Stateline	BLM	California Desert District	7,050	1994
Stepladder Mountains	BLM	California Desert District	81,600	1994
Surprise Canyon	BLM	California Desert District	29,180	1994
Sylvania Mountains	BLM	California Desert District	17,820	1987
Thousand Lakes	FS	Lassen NF	16,335	1964
Trilobite	BLM	California Desert District	31,160	1994
Trinity Alps	FS	Klamath NF	77,860	1984
Trinity Alps	BLM	NORCAL District	4,623	1984
Trinity Alps	FS	Shasta-Trinity NF	394,881	1984
Trinity Alps	FS	Six Rivers NF	25,400	1984
Turtle Mountains	BLM	California Desert District	144,500	1994
Ventana	FS	Los Padres NF	202,178	1969
Whipple Mountains	BLM	California Desert District	77,520	1994
Yolla Bolly-Middle Eel	FS	Mendocino NF	98,323	1964
Yolla Bolly-Middle Eel	BLM	NORCAL District	7,145	1964
Yolla Bolly-Middle Eel	FS	Shasta-Trinity NF	37,560	1964
Yolla Bolly-Middle Eel	FS	Six Rivers NF	10,813	1964
Yosemite	NPS	Yosemite NP	704,624	1984
TOTAL 13,957,063				
COLORADO				
Black Canyon of the Gunnison	NPS	Black Canyon of the Gunnison NM	11,180	1976
Buffalo Peaks	FS	Pike NF	22,810	1993
Buffalo Peaks	FS	San Isabel NF	20,600	1993
Byers Peak	FS	Arapaho NF	8,913	1993
Cache La Poudre	FS	Roosevelt NF	9,238	1980
Collegiate Peaks	FS	Gunnison NF	48,986	1980
Collegiate Peaks	FS	San Isabel NF	82,470	1980
Collegiate Peaks	FS	White River NF	35,482	1980
Comanche Peak	FS	Roosevelt NF	66,791	1980
Eagles Nest	FS	Arapaho NF	82,324	1976
Eagles Nest	FS	White River NF	50,582	1976
Flat Tops	FS	Routt NF	38,870	1975

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
COLORADO (cont.)				
Flat Tops	FS	White River NF	196,165	1975
Fossil Ridge	FS	Gunnison NF	31,534	1993
Great Sand Dunes	NPS	Great Sand Dunes NM	33,450	1976
Greenhorn Mountain	FS	San Isabel NF	22,040	1993
Holy Cross	FS	San Isabel NF	9,489	1980
Holy Cross	FS	White River NF	113,308	1980
Hunter-Fryingpan	FS	White River NF	81,866	1978
Indian Peaks	FS	Arapaho NF	40,109	1978
Indian Peaks	FS	Roosevelt NF	30,265	1978
Indian Peaks	NPS	Rocky Mountain NP	2,917	1978
La Garita	FS	Gunnison NF	79,822	1964
La Garita	FS	Rio Grande NF	49,036	1964
Lizard Head	FS	San Juan NF	20,391	1980
Lizard Head	FS	Uncompahgre NF	20,802	1980
Lost Creek	FS	Pike NF	119,790	1980
Maroon Bells-Snowmass	FS	Gunnison NF	19,194	1964
Maroon Bells-Snowmass	FS	White River NF	161,923	1964
Mesa Verde	NPS	Mesa Verde NP	8,100	1976
Mount Evans	FS	Arapaho NF	40,274	1980
Mount Evans	FS	Pike NF	34,127	1980
Mount Massive	FWS	Leadville NFH	2,560	1980
Mount Massive	FS	San Isabel NF	27,980	1980
Mount Sneffels	FS	Uncompahgre NF	16,565	1980
Mount Zirkel	FS	Routt NF	159,935	1964
Neota	FS	Roosevelt NF	9,657	1980
Neota	FS	Routt NF	267	1980
Never Summer	FS	Arapaho NF	14,088	1980
Never Summer	FS	Routt NF	6,659	1980
Platte River	FS	Routt NF	743	1984
Powderhorn	FS	Gunnison NF	13,395	1993
Powderhorn	BLM	Montrose District	48,115	1993
Ptarmigan Peak	FS	Arapaho NF	12,594	1993
Raggeds	FS	Gunnison NF	48,535	1980
Raggeds	FS	White River NF	16,457	1980
Rawah	FS	Roosevelt NF	71,606	1964

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
COLORADO (cont.)				
Rawah	FS	Routt NF	1,462	1964
Sangre de Cristo	FS	Rio Grande NF	133,780	1993
Sangre de Cristo	FS	San Isabel NF	92,640	1993
Sarvis Creek	FS	Routt NF	45,190	1993
South San Juan	FS	Rio Grande NF	87,847	1980
South San Juan	FS	San Juan NF	70,943	1980
Uncompahgre	BLM	Montrose District	3,390	1980
Uncompahgre	FS	Uncompahgre NF	99,331	1980
Vasquez Peak	FS	Arapaho NF	12,986	1993
Weminuche	FS	Rio Grande NF	164,715	1975
Weminuche	FS	San Juan NF	323,485	1975
West Elk	FS	Gunnison NF	176,172	1964
TOTAL 3,253,945				
FLORIDA				
Alexander Springs	FS	Ocala NF	7,941	1984
Big Gum Swamp	FS	Osceola NF	13,660	1984
Billies Bay	FS	Ocala NF	3,092	1984
Bradwell Bay	FS	Apalachicola NF	24,602	1975
Cedar Keys	FWS	Cedar Keys NWR	379	1972
Chassahowitzka	FWS	Chassahowitzka NWR	23,578	1976
Florida Keys	FWS	Great White Heron NWR	1,900	1975
Florida Keys	FWS	Key West NWR	2,019	1975
Florida Keys	FWS	National Key Deer Refuge	2,278	1975
Island Bay	FWS	Island Bay NWR	20	1970
J.N. "Ding" Darling	FWS	J.N. "Ding" Darling NWR	2,619	1976
Juniper Prairie	FS	Ocala NF	14,277	1984
Lake Woodruff	FWS	Lake Woodruff NWR	1,146	1976
Little Lake George	FS	Ocala NF	2,833	1984
Marjory Stoneman Douglas	NPS	Everglades NP	1,296,500	1964
Mud Swamp/New River	FS	Apalachicola NF	8,090	1984
Passage Key	FWS	Passage Key NWR	36	1970
Pelican Island	FWS	Pelican Island NWR	5	1970
St. Marks	FWS	St. Marks NWR	17,350	1975
TOTAL 1,422,325				

WILDERNESS: AN OVERVIEW

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
GEORGIA				
Big Frog	FS	Chattahoochee NF	89	1984
Blackbeard Island	FWS	Blackbeard Island NWR	3,000	1975
Blood Mountain	FS	Chattahoochee NF	7,800	1991
Brasstown	FS	Chattahoochee NF	12,896	1986
Cohutta	FS	Chattahoochee NF	35,268	1975
Cumberland Island	NPS	Cumberland Island NSS	8,840	1982
Ellicott Rock	FS	Chattahoochee NF	2,021	1975
Mark Trail	FS	Chattahoochee NF	16,400	1991
Okefenokee	FWS	Okefenokee NWR	353,981	1974
Raven Cliffs	FS	Chattahoochee NF	9,115	1986
Rich Mountain	FS	Chattahoochee NF	9,476	1986
Southern Nantahala	FS	Chattahoochee NF	11,770	1984
Tray Mountain	FS	Chattahoochee NF	9,702	1986
Wolf Island	FWS	Wolf Island NWR	5,126	1975
TOTAL 485,484				
HAWAII				
Haleakala	NPS	Haleakala NP	19,270	1976
Hawaii Volcanoes	NPS	Hawaii Volcanoes NP	123,100	1978
TOTAL 142,370				
IDAHO				
Craters of the Moon National	NPS	Craters of the Moon NM	43,243	1970
Frank Church-River of No Return	FS	Bitterroot NF	193,703	1980
Frank Church-River of No Return	FS	Boise NF	332,891	1980
Frank Church-River of No Return	FS	Challis NF	515,421	1980
Frank Church-River of No Return	BLM	Coeur d'Alene District	802	1980
Frank Church-River of No Return	FS	Nez Perce NF	110,773	1980
Frank Church-River of No Return	FS	Payette NF	791,675	1980
Frank Church-River of No Return	FS	Salmon NF	421,433	1980

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
IDAHO (cont.)				
Gospel-Hump	FS	Nez Perce NF	205,764	1978
Hells Canyon	FS	Nez Perce NF	59,900	1975
Hells Canyon	FS	Payette NF	23,911	1975
Salmo-Priest	FS	Idaho Panhandle	9,440	1984
Sawtooth	FS	Boise NF	150,071	1972
Sawtooth	FS	Challis NF	12,020	1972
Sawtooth	FS	Sawtooth NF	54,997	1972
Selway-Bitterroot	FS	Bitterroot NF	270,321	1964
Selway-Bitterroot	FS	Clearwater NF	259,165	1964
Selway-Bitterroot	FS	Nez Perce NF	559,531	1964
TOTAL 4,015,061				
ILLINOIS				
Bald Knob	FS	Shawnee NF	5,863	1990
Bay Creek	FS	Shawnee NF	2,866	1990
Burden Falls	FS	Shawnee NF	3,671	1990
Clear Springs	FS	Shawnee NF	4,730	1990
Crab Orchard	FWS	Crab Orchard NWR	4,050	1976
Garden of the Gods	FS	Shawnee NF	3,268	1990
Lusk Creek	FS	Shawnee NF	4,466	1990
Panther Den	FS	Shawnee NF	774	1990
TOTAL 29,688				
INDIANA				
Charles C. Deam	FS	Hoosier NF	12,945	1982
TOTAL 12,945				
KENTUCKY				
Beaver Creek	FS	Daniel Boone NF	4,753	1975
Clifty	FS	Daniel Boone NF	12,026	1985
TOTAL 16,779				
LOUISIANA				
Breton	FWS	Breton NWR	5,000	1975
Kisatchie Hills	FS	Kisatchie NF	8,679	1980
Lacassine	FWS	Lacassine NWR	3,345	1976
TOTAL 17,024				

WILDERNESS: AN OVERVIEW

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
MASSACHUSETTS				
Monomoy	FWS	Monomoy NWR	2,420	1970
TOTAL 2,420				
MAINE				
Caribou-Speckled Mountain	FS	White Mountain NF	12,000	1990
Moosehorn Wilderness (Baring Unit)	FWS	Moosehorn NWR	4,680	1975
Moosehorn Wilderness (Birch Islands Unit)	FWS	Moosehorn NWR	6	1970
Moosehorn Wilderness (Edmunds Unit)	FWS	Moosehorn NWR	2,706	1970
TOTAL 19,392				
MICHIGAN				
Big Island Lake	FS	Hiawatha NF	5,856	1987
Delirium	FS	Hiawatha NF	11,870	1987
Horseshoe Bay	FS	Hiawatha NF	3,790	1987
Huron Islands	FWS	Huron NWR	147	1970
Isle Royale	NPS	Isle Royale NP	132,018	1976
Mackinac	FS	Hiawatha NF	12,230	1987
McCormick	FS	Ottawa NF	16,532	1987
Michigan Islands	FWS	Michigan Islands NWR	12	1970
Nordhouse Dunes	FS	Manistee NF	3,450	1987
Rock River Canyon	FS	Hiawatha NF	4,640	1987
Round Island	FS	Hiawatha NF	378	1987
Seney	FWS	Seney NWR	25,150	1970
Sturgeon River Gorge	FS	Ottawa NF	12,925	1987
Sylvania	FS	Ottawa NF	18,327	1987
TOTAL 247,325				
MINNESOTA				
Agassiz	FWS	Agassiz NWR	4,000	1976
Boundary Waters Canoe Area	FS	Superior NF	808,974	1964
Tamarac	FWS	Tamarac NWR	2,180	1976
TOTAL 815,154				

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
MISSOURI				
Bell Mountain	FS	Mark Twain NF	8,977	1980
Devils Backbone	FS	Mark Twain NF	6,595	1980
Hercules-Glades	FS	Mark Twain NF	12,315	1976
Irish	FS	Mark Twain NF	16,277	1984
Mingo	FWS	Mingo NWR	7,730	1976
Paddy Creek	FS	Mark Twain NF	7,019	1983
Piney Creek	FS	Mark Twain NF	8,087	1980
Rockpile Mountain	FS	Mark Twain NF	4,089	1980
TOTAL 71,089				
MISSISSIPPI				
Black Creek	FS	Desoto NF	5,052	1984
Gulf Islands	NPS	Gulf Islands NSS	4,637	1978
Leaf	FS	Desoto NF	994	1984
TOTAL 10,683				
MONTANA				
Absaroka-Beartooth	FS	Custer NF	345,599	1978
Absaroka-Beartooth	FS	Gallatin NF	574,744	1978
Anaconda Pintler	FS	Beaverhead NF	72,677	1964
Anaconda Pintler	FS	Bitterroot NF	41,162	1964
Anaconda Pintler	FS	Deerlodge NF	44,154	1964
Bob Marshall	FS	Flathead NF	709,356	1964
Bob Marshall	FS	Lewis & Clark NF	300,000	1964
Cabinet Mountains	FS	Kaniksu NF	44,320	1964
Cabinet Mountains	FS	Kootenai NF	49,952	1964
Gates of the Mountains	FS	Helena NF	28,562	1964
Great Bear	FS	Flathead NF	286,700	1978
Lee Metcalf	FS	Beaverhead NF	107,694	1983
Lee Metcalf	FS	Gallatin NF	140,594	1983
Lee Metcalf	BLM	Butte District	6,000	1983
Medicine Lake	FWS	Medicine Lake NWR	11,366	1976
Mission Mountains	FS	Flathead NF	73,877	1975
Rattlesnake	FS	Lolo NF	32,976	1980
Red Rock Lakes	FWS	Red Rock Lakes NWR	32,350	1976
Scapegoat	FS	Helena NF	80,697	1972

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
MONTANA (cont.)				
Scapegoat	FS	Lewis & Clark NF	84,407	1972
Scapegoat	FS	Lolo NF	74,832	1972
Selway-Bitterroot	FS	Bitterroot NF	241,676	1964
Selway-Bitterroot	FS	Lolo NF	9,767	1964
UL Bend	FWS	UL Bend NWR	20,819	1976
Welcome Creek	FS	Lolo NF	28,135	1978
TOTAL 3,442,416				
NORTH CAROLINA				
Birkhead Mountains	FS	Uwharrie NF	5,025	1984
Catfish Lake South	FS	Croatan NF	8,530	1984
Ellicott Rock	FS	Nantahala NF	3,394	1975
Joyce Kilmer-Slickrock	FS	Nantahala NF	13,562	1975
Linville Gorge	FS	Pisgah NF	11,709	1964
Middle Prong	FS	Pisgah NF	7,460	1984
Pocosin	FS	Croatan NF	11,709	1984
Pond Pine	FS	Croatan NF	1,685	1984
Sheep Ridge	FS	Croatan NF	9,297	1984
Shining Rock	FS	Pisgah NF	18,483	1964
Southern Nantahala	FS	Nantahala NF	11,703	1984
Swanquarter	FWS	Swanquarter NWR	8,785	1976
TOTAL 111,342				
NORTH DAKOTA				
Chase Lake	FWS	Chase Lake NWR	4,155	1975
Lostwood	FWS	Lostwood NWR	5,577	1975
Theodore Roosevelt	NPS	Theodore Roosevelt NP	29,920	1978
TOTAL 39,652				
NEBRASKA				
Fort Niobrara	FWS	Fort Niobrara NWR	4,635	1976
Soldier Creek	FS	Nebraska NF	7,794	1986
TOTAL 12,429				
NEW HAMPSHIRE				
Great Gulf	FS	White Mountain NF	5,552	1964
Pemigewasset	FS	White Mountain NF	45,000	1984

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
NEW HAMPSHIRE (cont.)				
Presidential Range-Dry River	FS	White Mountain NF	27,380	1975
Sandwich Range	FS	White Mountain NF	25,000	1984
TOTAL 102,932				
NEW JERSEY				
Brigantine	FWS	Edwin B. Forsythe NWR	6,681	1975
Great Swamp National Wildlife Refuge	FWS	Great Swamp NWR	3,660	1968
TOTAL 10,341				
NEW MEXICO				
Aldo Leopold	FS	Gila NF	202,016	1980
Apache Kid	FS	Cibola NF	44,626	1980
Bandelier	NPS	Bandelier NM	23,267	1976
Bisti / De-na-zin	BLM	Farmington Field Office	59,450	1984
Blue Range	FS	Apache NF	28,104	1980
Blue Range	FS	Gila NF	1,200	1980
Bosque del Apache (Chupadera Unit)	FWS	Bosque del Apache NWR	5,289	1975
Bosque del Apache (Indian Well Unit)	FWS	Bosque del Apache NWR	5,139	1975
Bosque del Apache (Little San Pascual Unit)	FWS	Bosque del Apache NWR	19,859	1975
Capitan Mountains	FS	Lincoln NF	34,658	1980
Carlsbad Caverns	NPS	Carlsbad Caverns NP	33,125	1978
Cebolla	BLM	Albuquerque Field Office	62,800	1987
Chama River Canyon	FS	Carson NF	2,900	1978
Chama River Canyon	FS	Santa Fe NF	47,400	1978
Cruces Basin	FS	Carson NF	18,000	1980
Dome	FS	Santa Fe NF	5,200	1980
Gila	FS	Gila NF	558,014	1964
Latir Peak	FS	Carson NF	20,000	1980
Manzano Mountain	FS	Cibola NF	36,875	1978
Pecos	FS	Carson NF	24,736	1964
Pecos	FS	Santa Fe NF	198,597	1964
Salt Creek	FWS	Bitter Lake NWR	9,621	1970

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
NEW MEXICO (cont.)				
San Pedro Parks	FS	Santa Fe NF	41,132	1964
Sandia Mountain	FS	Cibola NF	37,877	1978
West Malpais	BLM	Albuquerque Field Office	39,700	1987
Wheeler Peak	FS	Carson NF	19,661	1964
White Mountain	FS	Lincoln NF	48,229	1964
Withington	FS	Cibola NF	19,000	1980
TOTAL 1,646,475				
NEVADA				
Alta Toquima	FS	Toiyabe NF	38,000	1989
Arc Dome	FS	Toiyabe NF	115,000	1989
Boundary Peak	FS	Inyo NF	10,000	1989
Currant Mountain	FS	Humboldt NF	36,000	1989
East Humboldts	FS	Humboldt NF	36,900	1989
Grant Range	FS	Humboldt NF	50,000	1989
Jarbidge	FS	Humboldt NF	113,167	1964
Mt. Charleston	FS	Toiyabe NF	43,000	1989
Mt. Moriah	BLM	Ely District	6,435	1989
Mt. Moriah	FS	Humboldt NF	70,000	1989
Mt. Rose	FS	Toiyabe NF	28,121	1989
Quinn Canyon	FS	Humboldt NF	27,000	1989
Ruby Mountains	FS	Humboldt NF	90,000	1989
Santa Rosa - Paradise Peak	FS	Humboldt NF	31,000	1989
Table Mountain	FS	Toiyabe NF	98,000	1989
TOTAL 792,623				
NEW YORK				
Fire Island	NPS	Fire Island NSS	1,363	1980
TOTAL 1,363				
OHIO				
West Sister Island	FWS	West Sister Island NWR	77	1975
TOTAL 77				
OKLAHOMA				
Black Fork Mountain	FS	Ouachita NF	4,789	1984

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
OKLAHOMA (cont.)				
Upper Kiamichi River	FS	Ouachita NF	9,754	1988
Wichita Mountains (Charons Garden Unit)	FWS	Wichita Mountains NWR	5,723	1970
Wichita Mountains (North Mountain Unit)	FWS	Wichita Mountains NWR	2,847	1970
TOTAL 23,113				
OREGON				
Badger Creek	FS	Mt. Hood NF	24,000	1984
Black Canyon	FS	Ochoco NF	13,400	1984
Boulder Creek	FS	Umpqua NF	19,100	1984
Bridge Creek	FS	Ochoco NF	5,400	1984
Bull of the Woods	FS	Mt. Hood NF	27,427	1984
Bull of the Woods	FS	Willamette NF	7,512	1984
Cummins Creek	FS	Siuslaw NF	9,173	1984
Diamond Peak	FS	Deschutes NF	34,413	1964
Diamond Peak	FS	Willamette NF	19,772	1964
Drift Creek	FS	Siuslaw NF	5,798	1984
Eagle Cap	FS	Wallowa NF	204,155	1964
Eagle Cap	FS	Whitman NF	145,832	1964
Gearhart Mountain	FS	Fremont NF	22,809	1964
Grassy Knob	FS	Siskiyou NF	17,200	1984
Hells Canyon	BLM	Vale District	1,038	1975
Hells Canyon	FS	Wallowa NF	118,247	1975
Hells Canyon	FS	Whitman NF	11,848	1975
Kalmiopsis	FS	Siskiyou NF	179,655	1964
Mark O. Hatfield	FS	Mt. Hood NF	39,000	1984
Menagerie	FS	Willamette NF	4,800	1984
Middle Santiam	FS	Willamette NF	7,500	1984
Mill Creek	FS	Ochoco NF	17,400	1984
Monument Rock	FS	Malheur NF	12,620	1984
Monument Rock	FS	Whitman NF	7,030	1984
Mount Hood	FS	Mt. Hood NF	47,160	1964
Mount Jefferson	FS	Deschutes NF	32,734	1968
Mount Jefferson	FS	Mt. Hood NF	5,021	1968
Mount Jefferson	FS	Willamette NF	69,253	1968

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
OREGON (cont.)				
Mount Thielsen	FS	Deschutes NF	14,116	1984
Mount Thielsen	FS	Umpqua NF	21,598	1984
Mount Thielsen	FS	Winema NF	25,567	1984
Mount Washington	FS	Deschutes NF	14,116	1964
Mount Washington	FS	Willamette NF	38,622	1964
Mountain Lakes	FS	Winema NF	23,071	1964
North Fork John Day	FS	Umatilla NF	107,058	1984
North Fork John Day	FS	Whitman NF	14,294	1984
North Fork Umatilla	FS	Umatilla NF	20,435	1984
Oregon Islands	FWS	Oregon Islands NWR	459	1970
Oregon Islands	FWS	Oregon Islands NWR	21	1970
Oregon Islands	FWS	Oregon Islands NWR	95	1970
Red Buttes	FS	Rogue River NF	350	1984
Red Buttes	FS	Siskiyou NF	3,400	1984
Rock Creek	FS	Siuslaw NF	7,486	1984
Rogue-Umpqua Divide	FS	Rogue River NF	6,850	1984
Rogue-Umpqua Divide	FS	Umpqua NF	26,350	1984
Salmon-Huckleberry	FS	Mt. Hood NF	44,560	1984
Sky Lakes	FS	Rogue River NF	75,695	1984
Sky Lakes	FS	Winema NF	40,605	1984
Strawberry Mountain	FS	Malheur NF	68,700	1964
Table Rock	BLM	Salem District	5,500	1984
Three Arch Rocks	FWS	Three Arch Rocks NWR	15	1970
Three Sisters	FS	Deschutes NF	94,370	1964
Three Sisters	FS	Willamette NF	192,338	1964
Waldo Lake	FS	Willamette NF	39,200	1984
Wenaha-Tucannon	FS	Umatilla NF	66,417	1978
Wild Rogue	FS	Siskiyou NF	25,658	1978
Wild Rogue	BLM	Medford District	10,160	1978
TOTAL 2,096,403				
PENNSYLVANIA				
Allegheny Islands	FS	Allegheny NF	368	1984
Hickory Creek	FS	Allegheny NF	8,663	1984
TOTAL 9,031				

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
SOUTH CAROLINA				
Cape Romain	FWS	Cape Romain NWR	29,000	1975
Congaree Swamp National Monument	NPS	Congaree Swamp NM	15,010	1988
Ellicott Rock	FS	Sumter NF	2,859	1975
Hell Hole Bay	FS	Francis Marion NF	2,125	1980
Little Wambaw Swamp	FS	Francis Marion NF	5,047	1980
Wambaw Creek	FS	Francis Marion NF	1,825	1980
Wambaw Swamp	FS	Francis Marion NF	4,815	1980
TOTAL	60,681			
SOUTH DAKOTA				
Badlands	NPS	Badlands NM	64,144	1976
Black Elk	FS	Black Hills NF	9,826	1980
TOTAL 73,970				
TENNESSEE				
Bald River Gorge	FS	Cherokee NF	3,721	1984
Big Frog	FS	Cherokee NF	7,993	1984
Big Laurel Branch	FS	Cherokee NF	6,332	1986
Citico Creek	FS	Cherokee NF	16,226	1984
Cohutta	FS	Cherokee NF	1,709	1975
Gee Creek	FS	Cherokee NF	2,493	1975
Joyce Kilmer-Slickrock	FS	Cherokee NF	3,832	1975
Little Frog Mountain	FS	Cherokee NF	4,666	1986
Pond Mountain	FS	Cherokee NF	6,890	1986
Sampson Mountain	FS	Cherokee NF	7,991	1986
Unaka Mountain	FS	Cherokee NF	4,496	1986
TOTAL 66,349				
TEXAS				
Big Slough	FS	Davy Crockett NF	3,455	1984
Guadalupe Mountains	NPS	Guadalupe Mountains NP	46,850	1978
Indian Mounds	FS	Sabine NF	12,369	1984
Little Lake Creek	FS	Sam Houston NF	3,855	1984
Turkey Hill	FS	Angelina NF	5,473	1984
Upland Island	FS	Angelina NF	13,331	1984
TOTAL 85,333				

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
UTAH				
Ashdown Gorge	FS	Dixie NF	7,043	1984
Beaver Dam Mountains	BLM	Cedar City District	2,600	1984
Box-Death Hollow	FS	Dixie NF	25,751	1984
Dark Canyon	FS	Manti-La Sal NF	47,116	1984
Deseret Peak	FS	Wasatch NF	25,212	1984
High Uintas	FS	Ashley NF	276,175	1984
High Uintas	FS	Wasatch NF	180,530	1984
Lone Peak	FS	Uinta NF	21,166	1978
Lone Peak	FS	Wasatch NF	8,922	1978
Mount Naomi	FS	Cache NF	44,523	1984
Mount Nebo.	FS	Uinta NF	27,010	1984
Mount Olympus	FS	Wasatch NF	15,300	1984
Mount Timpanogos	FS	Uinta NF	10,518	1984
Paria Canyon-Vermilion Cliffs	BLM	Cedar City District	20,000	1984
Pine Valley Mountain	FS	Dixie NF	50,232	1984
Twin Peaks	FS	Wasatch NF	11,334	1984
Wellsville Mountain	FS	Cache NF	22,986	1984
TOTAL	796,418			
VIRGINIA				
Barbours Creek	FS	George Washington NF	4	1988
Barbours Creek	FS	Jefferson NF	5,378	1988
Beartown	FS	Jefferson NF	5,609	1984
James River Face	FS	Jefferson NF	8,886	1975
Kimberling Creek	FS	Jefferson NF	5,542	1984
Lewis Fork	FS	Jefferson NF	5,618	1984
Little Dry Run	FS	Jefferson NF	2,858	1984
Little Wilson Creek	FS	Jefferson NF	3,613	1984
Mountain Lake	FS	Jefferson NF	8,314	1984
Peters Mountain	FS	Jefferson NF	3,326	1984
Ramseys Draft	FS	George Washington NF	6,518	1984
Rich Hole	FS	George Washington NF	6,450	1988
Rough Mountain	FS	George Washington NF	9,300	1988
Saint Mary's	FS	George Washington NF	9,835	1984
Shawvers Run	FS	George Washington NF	101	1988

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
VIRGINIA (cont.)				
Shawvers Run	FS	Jefferson NF	3,366	1988
Shenandoah	NPS	Shenandoah NP	79,579	1976
Thunder Ridge	FS	Jefferson NF	2,344	1984
TOTAL 166,641				
VERMONT				
Big Branch	FS	Green Mountain NF	6,720	1984
Breadloaf	FS	Green Mountain NF	21,480	1984
Bristol Cliffs	FS	Green Mountain NF	3,738	1975
George D. Aiken	FS	Green Mountain NF	5,060	1984
Lye Brook	FS	Green Mountain NF	15,503	1975
Peru Peak	FS	Green Mountain NF	6,920	1984
TOTAL 59,421				
WASHINGTON				
Alpine Lakes	FS	Mt. Baker-Snoqualmie NF	117,825	1976
Alpine Lakes	FS	Wenatchee NF	244,845	1976
Boulder River	FS	Mt. Baker-Snoqualmie NF	48,674	1984
Buckhorn	FS	Olympic NF	44,258	1984
Clearwater	FS	Mt. Baker-Snoqualmie NF	14,374	1984
Colonel Bob	FS	Olympic NF	11,961	1984
Glacier Peak	FS	Mt. Baker-Snoqualmie NF	283,252	1964
Glacier Peak	FS	Wenatchee NF	289,086	1964
Glacier View	FS	Gifford Pinchot NF	3,123	1964
Goat Rocks	FS	Gifford Pinchot NF	71,203	1964
Goat Rocks	FS	Mt. Baker-Snoqualmie NF	37,076	1964
Henry M. Jackson	FS	Mt. Baker-Snoqualmie NF	74,921	1984
Henry M. Jackson	FS	Wenatchee NF	25,416	1984
Indian Heaven	FS	Gifford Pinchot NF	20,960	1984
Juniper Dunes	BLM	Spokane District	7,140	1984
Lake Chelan-Sawtooth	FS	Okanogan NF	95,021	1984
Lake Chelan-Sawtooth	FS	Wenatchee NF	56,414	1984
Mount Adams	FS	Gifford Pinchot NF	46,626	1964
Mount Baker	FS	Mt. Baker-Snoqualmie NF	117,528	1964
Mount Rainier	NPS	Mount Rainier	228,480	1988
Mount Skokomish	FS	Olympic NF	15,686	1984

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
WASHINGTON (cont.)				
Noisy-Diobsud	FS	Mt. Baker NF	14,133	1984
Norse Peak	FS	Snoqualmie NF	52,180	1984
Olympic	NPS	Olympic NP	876,669	1988
Pasayten	FS	Mt. Baker NF	107,039	1968
Pasayten	FS	Okanogan NF	422,992	1968
Salmo-Priest	FS	Colville NF	29,386	1984
Salmo-Priest	FS	Kaniksu NF	11,949	1984
San Juan	FWS	San Juan Islands NWR	353	1976
Stephen Mather	NPS	North Cascades NP	634,614	1988
Tatoosh	FS	Gifford Pinchot NF	15,750	1984
The Brothers	FS	Olympic NF	17,239	1984
Trapper Creek	FS	Gifford Pinchot NF	5,970	1984
Washington Islands	FWS	Copalis NWR	60	1970
Washington Islands	FWS	Flattery Rocks NWR	125	1970
Washington Islands	FWS	Quillayute Needles NWR	300	1970
Wenaha-Tucannon	FS	Umatilla NF	111,048	1978
William O. Douglas	FS	Gifford Pinchot NF	15,469	1984
William O. Douglas	FS	Snoqualmie NF	152,688	1984
Wonder Mountain	FS	Olympic NF	2,349	1984
TOTAL 4,324,182				
WISCONSIN				
Blackjack Springs	FS	Nicolet NF	5,886	1978
Headwaters	FS	Nicolet NF	18,188	1984
Porcupine Lake	FS	Chequamegon NF	4,292	1984
Rainbow Lake	FS	Chequamegon NF	6,583	1975
Whisker Lake	FS	Nicolet NF	7,345	1978
Wisconsin Islands	FWS	Gravel Island NWR	27	1970
Wisconsin Islands	FWS	Green Bay NWR	2	1970
TOTAL 42,323				
WEST VIRGINIA				
Cranberry	FS	Monongahela NF	35,864	1983
Dolly Sods	FS	Monongahela NF	10,215	1975
Laurel Fork North	FS	Monongahela NF	6,055	1983
Laurel Fork South	FS	Monongahela NF	5,997	1983

Wilderness Name	Agency	Administrative Unit	Acreage	Year Designated
WEST VIRGINIA (cont.)				
Mountain Lake	FS	Jefferson NF	2,721	1984
Otter Creek	FS	Monongahela NF	20,000	1975
TOTAL 80,852				
WYOMING				
Absaroka-Beartooth	FS	Shoshone NF	23,283	1978
Bridger	FS	Bridger NF	428,087	1964
Cloud Peak	FS	Bighorn NF	189,039	1984
Encampment River	FS	Medicine Bow NF	10,024	1984
Fitzpatrick	FS	Shoshone NF	198,525	1976
Gros Ventre	FS	Teton NF	317,874	1984
Huston Park	FS	Medicine Bow NF	30,588	1984
Jedediah Smith	FS	Targhee NF	123,451	1984
North Absaroka	FS	Shoshone NF	350,488	1964
Platte River	FS	Medicine Bow NF	22,749	1984
Popo Agie	FS	Shoshone NF	101,870	1984
Savage Run	FS	Medicine Bow NF	14,927	1978
Teton	FS	Teton NF	585,238	1964
Washakie	FS	Shoshone NF	704,274	1964
Winegar Hole	FS	Targhee NF	10,715	1984
TOTAL 3,111,132				

WILDERNESS ACT

Act of September 3, 1964,

(P.L 88-577, 78 Stat. 890; 16 U.S.C. 1 1 21 (note), 1 1 31-1136)

To establish a National Wilderness Preservation System for the permanent good of the whole people, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

Short Title

Sec 1. This Act may be cited as the "Wilderness Act" (I 6 U.S.C. 1 1 21 (note))

Wilderness Act

WILDERNESS SYSTEM ESTABLISHED STATEMENT OF POLICY

Sec. 2. (a) In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify, all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition, it is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness. For this purpose there is hereby established a National Wilderness Preservation System to be composed of federally owned areas designated by Congress as "wilderness areas", and these shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness; and no Federal lands shall be designated as "wilderness areas" except as provided for in this Act or by a subsequent Act.

(b) The inclusion of an area in the National Wilderness Preservation System notwithstanding, the area shall continue to be managed by the Department and agency having jurisdiction thereover immediately before its inclusion in the National Wilderness Preservation System unless otherwise provided by Act of Congress. No appropriation shall be available for the payment of expenses or salaries for the administration of the National Wilderness Preservation System as a separate unit nor shall any appropriations be available for additional personnel stated as being required solely for the purpose of managing or administering areas solely because they are included within the National Wilderness Preservation System.

78 STAT. 890.
78 STAT. 891.

DEFINITION OF WILDERNESS

(c) A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has a least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological or other features of scientific, educational, scenic, or historical value. (16 U.S.C. 1131)

NATIONAL WILDERNESS PRESERVATION SYSTEM— EXTENT OF SYSTEM

Sec. 3. (a) All areas within the national forests classified at least 30 days before the effective date of the Act by the Secretary of Agriculture or the Chief of the Forest Service as 'wilderness', 'wild" or "canoe" are hereby designated as wilderness areas. The Secretary of Agriculture shall--

(1) Within one year after the effective date of this Act, file a map and legal description of each wilderness area with the Interior and Insular Affairs Committees of the United States Senate and House of Representatives, and such descriptions shall have the same force and effect as if included in this Act: Provided however, That correction of clerical and typographical errors in such legal descriptions and maps may be made.

(2) Maintain, available to the public, records pertaining to said wilderness areas, including maps and legal descriptions, copies of regulations governing them, copies of public notices of, and reports submitted to Congress regarding pending additions, eliminations, or modifications. Maps, legal descriptions, and regulations pertaining to wilderness areas within their respective jurisdictions also shall be available to the public in the offices of regional foresters, national forest supervisors, and forest rangers.

Classification

Presidential recommendation to Congress.

Congressional approval.

78 STAT. 891.
78 STAT. 892.

(b) The Secretary of Agriculture shall, within ten years after the enactment of this Act, review, as to its suitability or nonsuitability for preservation as wilderness, each area in the national forests classified on the effective date of this Act by the Secretary of Agriculture or the Chief of the Forest Service as "primitive" and report his finding to the President. The President shall advise the United States Senate and House of Representatives of his recommendations with respect to the designation as "wilderness" or other reclassification of each area on which review has been completed, together with maps and a definition of boundaries. Such advice shall be given with respect to not less than one-third of all the areas now classified as "primitive" within three years after the enactment of this Act, not less than two-thirds within seven years after the enactment of this Act, and the remaining areas within ten years after the enactment of this Act. Each recommendation of the President for designation as "wilderness" shall become effective only if so provided by an Act of Congress. Areas classified as "primitive" on the effective date of this Act shall continue to be administered under the rules and regulations affecting such areas on the effective date of this Act until Congress has determined otherwise. Any such area may be increased in size by the President at the time he submits his recommendations the Congress by not more than five thousand acres with no more than one thousand two hundred and eighty acres of such increase in any one compact unit; if it proposed to increase the size of any area by more than five thousand acres or by more than one thousand two hundred and eighty acres in any one compact unit the increase in size shall not become effective until acted upon by Congress. Nothing herein contained shall limit the President in proposing, as part of his recommendations to Congress, the alteration of existing boundaries of primitive areas or recommending the addition of any contiguous area of national forest lands predominately of wilderness value. Notwithstanding any other provisions of this Act, the Secretary of Agriculture may complete his review and delete such area as may be necessary, but not to exceed seven thousand acres, from the southern tip of the Gore Range-Eagles Nest Primitive Area, Colorado, if the Secretary determines that such action is in the public interest.

(c) Within ten years after the effective date of this Act the Secretary of the Interior shall review every roadless area of five thousand contiguous acres or more in the national parks, monuments and other units of the national park system and every such area of, and every roadless island within, the national wildlife refuges and game ranges, under his jurisdiction on the effective date of this Act and shall report to the President his recommendation as to the suitability or nonsuitability of each such area or island for preservation as wilderness. The President shall advise the President of the Senate and the Speaker of the House of Representatives of his recommendation with respect to the designation as wilderness of each such area or island on which review has been completed, together with a map thereof and a definition of its boundaries. Such advice shall be given with respect to not less than one-third of the areas and islands to be reviewed under this subsection within three years after enactment of this Act, not less than two-thirds within seven years of enactment of this Act, and the remainder within ten years of enactment of this Act. A recommendation of the President for designation as wilderness shall become effective only if so provided by an Act of Congress. Nothing contained herein shall, by implication or otherwise, be construed to lessen the present statutory authority of the Secretary of the Interior with respect to the maintenance of roadless areas within the national park system.

Report to the President.

Presidential recommendation to Congress.

Congressional approval.

(d) **(1)** The Secretary of Agriculture and the Secretary of the Interior shall, prior to submitting any recommendations to the President with respect to the suitability of any area for preservation as wilderness--

Suitability.

(A) give such public notice of the proposed action as they deem appropriate, including publication in the Federal Register and in a newspaper having general circulation in the area or areas in the vicinity of the affected land;

Publication in Federal Register.

(B) hold a public hearing or hearings at a location or locations convenient to the areas affected. The hearings shall be announced through such means as the respective Secretaries involved deem appropriate, including notices in the Federal Register and in newspapers of general circulation in the area: Provided, That if the lands involved are located in more than one State, at least one hearing shall be held in each State in which a portion of the land lies;

Hearings.

Publication in Federal Register.

(C) at least thirty days before the date of a hearing advise the Governor of the State and the governing board of each county, or in Alaska the borough, in which the lands are located, and Federal departments and agencies concerned, and invite such officials and Federal agencies to submit their views on the proposed action at the hearing or by no later than thirty days following the date of the hearing.

78 STAT. 892.
78 STAT. 893.

(2) Any views submitted to the appropriate Secretary under the provisions of (1) of this subsection with respect to any area shall be included with any recommendations to the President and to Congress with respect to such area.

Proposed modification.

(e) Any modification of adjustment of boundaries of any wilderness area shall be recommended by the appropriate Secretary after public notice of such proposal and public hearing or hearings as provided by in subsection (d) of this section. The proposed modification or adjustment shall then be recommended with map and description thereof to the President. The President shall advise the United States Senate and the House of Representatives of his recommendations with respect to such

modification or adjustment and such recommendation shall become effective only in the same manner as provided for in subsections (b) and (c) of this section. (16 U.S.C. 1132)

USE OF WILDERNESS AREAS

Sec. 4. (a) The purposes of this Act are hereby declared to be within and supplemental to the purposes for which national forests and units of the national park and national wildlife refuge systems are established and administered and--

16 USC 475.
16 USC 528-531

(1) Nothing in this Act shall be deemed to be in interference with the purpose for which national forests are established as set forth in the Act of June 4, 1897 (30 Stat. 1 1), and the Multiple-Use Sustained-Yield Act of June 12, 1960 (74 Stat. 215).

16 USC 577-577b
16 USC 577c-577h
16USC 577d-l, 577g-l, 577h

(2) Nothing in this Act shall modify the restrictions and provisions of the Shipstead-Nolan Act (Public Law 539, Seventy-first Congress, July 10, 1930; 46 Stat. 1020), the Thye-Blatnick Act (Public Law 733, Eightieth Congress, June 22, 1948; 62 Stat. 568), and the Humphrey-Thye-Blatnik-Andresen Act (Public Law 607, Eighty-fourth congress, June 22, 1956; 70 Stat. 326), as applying to the Superior National Forest or the regulations of the Secretary of Agriculture.

39 STAT. 535.
16USC 1 et seq

41 STAT. 1063.
49 STAT. 838.

(3) Nothing in this Act shall modify the statutory authority under which units of the national park system are created. Further, the designation of any area of any park, monument, or other unit of the national park system as a wilderness area pursuant to this Act shall in no manner lower the standards evolved for the use and preservation of such park, monument, or other unit of the national park system in accordance with the Act of August 25, 1916, the statutory authority under which the area was created, or any other Act of Congress which might pertain to or affect such area, including, but not limited to, the Act of June 8, 1906 (34 Stat. 225; 16 U.S.C. 432 et seq.); section 3(2) of the Federal Power Act (16 U.S.C. 796(2)); and the Act of August 21, 1935 (49 Stat. 666; 16 U.S.C. 461 et seq.).

78 STAT. 893.
78 STAT. 894.

(b) Except as otherwise provided in this Act, each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character. Except as otherwise provided in this Act, wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use.

PROHIBITION OF CERTAIN USES

(c) Except as specifically provided for in this Act, and subject to existing private rights, there shall be no commercial enterprise and no permanent road within any wilderness area designated by this Act and, except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area.

SPECIAL PROVISIONS

(d) The following special provisions are hereby made:

(1) Within wilderness areas designated by this Act the use of aircraft or motorboats, where these uses have already become established, may be permitted to continue subject to such restriction as the Secretary of Agriculture deems desirable. In addition, such measures may be taken as may be necessary in the control of fire, insects, and diseases, subject to such conditions as the Secretary deems desirable.

(2) Nothing in this Act shall prevent within national forest wilderness areas any activity, including prospecting, for the purpose of gathering information about mineral or other resources, if such activity is carried on in a manner compatible with the preservation of the wilderness environment. Furthermore, in accordance with such program as the Secretary of the Interior shall develop and conduct in consultation with the Secretary of Agriculture, such areas shall be surveyed on a planned, recurring basis consistent with the concept of wilderness preservation by the Geological Survey and the Bureau of Mines to determine the mineral values, if any, that may be present; and the results of such surveys shall be made available to the public and submitted to the President and Congress.

Mineral leases, claims, etc.

(3) Notwithstanding any other provisions of this Act, until midnight December 31, 1983, the United States mining laws and all laws pertaining to mineral leasing shall, to the same extent as applicable prior to the effective date of this Act, extend to those national forest lands designated by this Act as "wilderness areas"; subject, however, to such reasonable regulations governing ingress and egress as may be prescribed by the Secretary of Agriculture consistent with the use of the land for mineral location and development and exploration, drilling, and production, and use of land for transmission lines, waterlines, telephone lines, or facilities necessary in exploring, drilling, producing, mining, and processing operations, including where essential the use of mechanized ground or air equipment and restoration as near as practicable of the surface of the land disturbed in performing prospecting, location, and in oil and gas leasing, discovery work, exploration, drilling, and production, as soon as they have served their purpose. Mining locations lying within the boundaries of said wilderness areas shall be held and used solely for mining or processing operations and uses reasonably incident thereto; and hereafter, subject to valid existing rights, all patents issued under the mining laws of the United States affecting national forest lands designated by this Act as wilderness areas shall convey title to the mineral deposits within the claim, together with the right to cut and use so much

78 STAT. 894.
78 STAT. 895.

of the mature timber therefrom as may be needed in the extraction, removal, and beneficiation of the mineral deposits, if needed timber is not otherwise reasonably available, and if the timber is cut under sound principles of forest management as defined by the national forest rules and regulations, but each such patent shall reserve to the United States all title in or to the surface of the lands and products there of, and no use of the surface of the claim or the resources therefrom not reasonably required for carrying on mining or prospecting shall be allowed except as otherwise expressly provided in the Act: *Provided,* That unless hereafter specifically authorized, no patent within wilderness areas designated by this Act shall issue after December 31, 1983, except for the valid claims existing on or before December 31, 1983. Mining claims located after the effective date of this Act within the boundaries of wilderness areas designated by this Act shall create no rights in excess of those rights which may be patented under the provisions of this subsection. Mineral leases, permits, and licenses covering lands within national forest wilderness areas designated by this Act shall contain such reasonable stipulations as may be prescribed by the Secretary of Agriculture for the protection of the wilderness character of the land consistent with the use of the land for the purposes for which they are leased, permitted, or licensed. Subject to valid rights then existing, effective January 1, 1984, the minerals in lands designated by this Act as wilderness areas are withdrawn from all forms of appropriation under the mining laws and from disposition under all laws pertaining to mineral leasing and all amendments thereto.

Water resources

(4) Within wilderness areas in the national forests designated by this Act, (1) the President may, within a specific area and in accordance with such regulations as he may deem desirable, authorize prospecting for water resources, the establishment and maintenance of reservoirs, water-conservation works, power projects, transmission lines, and other facilities needed in the public interest, including the road construction and maintenance essential to development and use thereof, upon his determination that such use or uses in the specific area will better serve the interests of the United States and the people thereof than will its denial; and (2) the grazing of livestock, where established prior to the effective date of this Act, shall be permitted to continue subject to such reasonable regulations as are deemed necessary by the Secretary of Agriculture.

(5) Other provisions of this Act to the contrary notwithstanding, the management of the Boundary Waters Canoe Area, formerly designated as the Superior, Little Indian Sioux and Caribou Roadless Areas, in the Superior National Forest, Minnesota, shall be in accordance with regulations established by the Secretary of Agriculture in accordance with the general purpose of maintaining, without unnecessary restrictions on other uses, including that of timber, the primitive character of the area, particularly in the vicinity of the lakes, streams, and portages: Provided, That nothing in this Act shall preclude the continuance within the area of any already established use of motorboats.

(6) Commercial services may be performed within the wilderness areas designated by this Act to the extent necessary for activities which are proper for realizing the recreational or other wilderness purposes of the areas.

(7) Nothing in this Act shall constitute an express or implied claim or denial on the part of the Federal Government as to exemption from State water laws.

(8) Nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the several States with respect to wildlife and fish in the national forests (16 U.S.C. 1133)

789 STAT. 895.
78 STAT. 896.

STATE AND PRIVATE LANDS WITHIN WILDERNESS AREAS

Sec. 5. **(a)** In any case where State-owned or privately owned land is completely surrounded by national forest lands with areas designated by this Act as wilderness, such State or private owner shall be given such rights as may be necessary to assure adequate access to such State-owned or privately owned land by such State or private owner and their successors in interest, or the State-owned land or privately owned land shall be exchanged for federally owned land in the same State of approximately equal value under authorities available to the Secretary of Agriculture: Provided, however, That the United States shall not transfer to a State or private owner any mineral interests unless the State or private owner relinquishes or causes to be relinquished to the United States the mineral interest in the surrounded land.

Transfers, restriction.

(b) In any case where valid mining claims or other valid occupancies are wholly within a designated national forest wilderness area, the Secretary of Agriculture shall, by reasonable regulations consistent with the preservation of the area of wilderness, permit ingress and egress to such surrounded areas by means which have been or are being customarily enjoyed with respect to other such areas similarly situated.

78 STAT. 896.

(c) Subject to the appropriation of funds by Congress, the Secretary of Agriculture is authorized to acquire privately owned land within the perimeter of any area designated by this Act as wilderness if (1) the owner concurs in such acquisition or (2) the acquisition is specifically authorized by Congress (16 U.S.C. 1134)

Acquisition.

GIFTS, BEQUESTS, AND CONTRIBUTIONS

Sec. 6. **(a)** The Secretary of Agriculture may accept gifts or bequests of land within wilderness areas designated by this Act for preservation as wilderness. The Secretary of Agriculture may also accept gifts or bequests of land adjacent to wilderness areas designated by this Act for preservation as wilderness if he has given sixty days advance notice thereof to the President of the Senate and the Speaker of the House of Representatives. Land accepted by the Secretary of Agriculture under this section shall become part of the wilderness area involved. Regulations with regard to any such land may be in accordance with such agreements, consistent with the policy of this Act, as are made at the time of such gift, or such conditions, consistent with such policy, as may be included in, and accepted with, such bequest.

(b) The Secretary of Agriculture or the Secretary of the Interior is authorized to accept private contributions and gifts to be used to further the purposes of this Act. (16 U.S.C. 1135)

ANNUAL REPORTS

Sec. 7. At the opening of each session of Congress, the Secretaries of Agriculture and Interior shall jointly report to the President for transmission to Congress on the status of the wilderness system, including a list and descriptions of the areas in the system, regulations in effect, and other pertinent information, together with any recommendations they may care to make. (16 U.S.C. 11 36)

APPROVED SEPTEMBER 3, 1964.

Legislative History:

House Reports: No 1538 accompanying H.R. 9070 (Committee on Interior & Insular Affairs) and No. 1829 (Committee of Conference).
Senate report: No. 109 (Committee on Interior & Insular Affairs). Congressional Record:
Vol. 109 (1963): April 4, 8, considered in Senate.
April 9, considered and passed Senate.
Vol. 110 (1964): July 28, considered in House.
July 30, considered and passed House, amended, in lieu of H.R. 9070
August 20, House and Senate agreed to conference report.

LEAVE NO TRACE FIELD EXPERIENCE

LESSON 1 • The Best Trip is Well Planned!

Objectives:
Students will:

- identify at least three reasons why trip planning is important.
- describe the key elements included in successful planning preparation.
- create a planning and preparation list to use in making travel decisions in the future.
- plan and calculate group needs for calories, weight, and cost and then develop a "Total Food Planning" list.
- demonstrate knowledge of **Leave No Trace** principles in a "Skills Trail."

Background:
One of the most important **Leave No Trace** (LNT) principles is: **Plan Ahead and Prepare**. Adequate trip planning and preparation helps you and your students accomplish trip goals safely and enjoyably while minimizing impacts on the land. This lesson and activities focus on why trip planning is important, what it entails, and how to go about it. The "Elements to Consider When Planning a Trip" teacher/student handout and the "Nutrition and Rations Planning" teacher/student handout serve as background for this lesson. Display the **Leave No Trace** poster in the classroom as a quick reference for students.

Activity 1: Are You Ready?

Materials:

- pictures depicting a local or regional environment (high alpine, desert, river, etc.)
- copies of student handout: "Elements to Consider When Planning a Trip," page 65.

Duration: 1 class period

Location: indoors or outdoors

Procedure:

1. Ask students to bring a pack packed for a day hike. Don't reveal a destination or suggest contents—explain it is a practice exercise. If students are not familiar with packing a day pack, prepare one pack as an example.

2. Break students into groups of three to five. Explain that you are going on an imaginary day hike. Build suspense by asking students to guess the destination. Show the destination

Procedure continued:
pictures and describe the location you selected (weather, terrain, etc.). Explain the goal of the trip is to bird watch. Ask groups to unpack their packs and discuss their answers to the following questions:

Do the contents of your pack properly prepare you for this trip?

- Do the contents ensure your safety?

  Check for proper clothing, maps, compass, small flashlight, water filter, first aid kit…
- Do the contents ensure you will **Leave No Trace**—that you will not damage natural resources? Check for stove, repackaged food, cat hole trowel, no hatchet, plastic jug for water…
- Do the contents ensure your trip will meet your goal—bird watching—safely and enjoyably? Check for binoculars, camera, bird book…

3. Assign as individual or group reading, "Elements to Consider When Planning a Trip" student handout. Facilitate a discussion with students about the results of the activity. Ask small groups to briefly share the answers to the above questions.

   Key facilitator discussion points:

   - How would the contents of your pack differ with different destinations?

     The equipment, clothing, and food chosen would change to suit the intended destination.
   - What other information do you need to pack properly for a trip?

     There are at least seven elements described in student handout.
   - What is the value of pre-trip planning before packing?

     Helps ensure the safety of the traveler, accomplish trip goals safely and enjoyably, and minimizes impact to resources.

Credit:
Teaching Leave No Trace, Activities to Teach Responsible Backcountry Skills, U.S. Forest Service and Bureau of Land Management.

Activity 2: Will You Make It?

Materials:
- 1 photocopy set of "Will You Make It?" travel cards per group of 3 - 5 students, pages 66-69.

Duration: 1 class period

Location: indoors or outdoors

Procedure:

1. Read the entire lesson plan. Make copies of handout and cards. Cut the "Will You Make It?" Travel Cards into individual sets.

2. Explain to students that they will identify events which can interfere with a successful trip. These are real-life scenarios emphasizing the need to plan solutions to potential problems before a trip. Students can work in the same small groups as designated for Activity 1, "Are You Ready?"

3. Match events and solutions. Evenly distribute event and solution cards. The goal is to have people find the group member with the corresponding event or solution card and form a pair. You may have to use the key to ensure correct pairing.

4. Plan a presentation. Once all solutions are matched to the corresponding event, have each pair plan some way to teach their plan-ahead concept. Allow group members to be as imaginative as they like. Some ideas include: pantomime, acting out, lecture, or drawing.

5. Give a presentation. Have each pair teach their concept to the rest of the group using the presentation method they have chosen.

6. Facilitate learning by discussing the scenarios after they are presented. Make sure each event is discussed. Emphasize the key elements of trip planning presented in the student handout "Elements to Consider When Planning a Trip." Tie these key elements to the importance of good preparation.

7. Create a "Planning a Preparation Checklist" you can use to plan your next trip. Use the answers to these questions in creating the checklist.

   - Can your group identify at least three reasons why trip planning is important?
   - Can your group describe seven key elements included in successful planning and preparation (Will You Make It" handout)
   - Do solutions to planning elements change depending on the environment visited, i.e. desert vs. high alpine areas? Reflect back on conservation that resulted from the imaginary day hike to the desert and alpine environments.

Travel Card Key

Event Card	**Solution Card**
12	1
2	9
15	3
4	11
14	5
6	13
10	7
8	16

Credit: *Teaching Leave No Trace, Activities to Teach Responsible Backcountry Skills*, U.S. Forest Service and Bureau of Land Management.

Activity 3: Developing a "Total Food Planning" List

Materials:

- student/teacher handout: "Elements to Consider When Planning a Trip," page 65.
- student/teacher handout: "Nutrition and Rations Planning," pages 70-75.
- NOLS Cookery
- Wilderness Ranger Cookbook

Duration: 1 to 2 class periods

Location: classroom

Procedure:

1. Review student handout "Elements to Consider When Planning a Trip." You can provide hard copies for students or make into an overhead transparency.
2. In large group discussion cover these key elements from the student/teacher handout "Nutrition and Rations Planning."
3. Explain to the students that they will be creating a "Total Food Plan" for a real or imaginary trip to meet the needs of your class. Small groups will develop a "Master Food List." Students can get ideas from "Master Food List" at the end of this lesson or refer to the cookbooks "NOLS Cookery" and "Wilderness Ranger Cookbook."
4. Break the class into groups of four. Each group will complete a food plan. Provide each group with a copy of the student/teacher handout "Nutrition and Rations." Students will calculate the calories needed for their group, the total weight of their group's food, and the individual weight to be carried. They will also determine the food's cost. Using these figures, each group should be able to determine a food list which meets calorie, weight, and cost criteria.
5. If time permits, each small group can share their results. Each group's "Master Food List" can be critiqued by the rest of the class.
6. Students can create a computer program to display all necessary information to plan a "Master Food List."

Activity 4: The Skills Trail

Background:
The skills trail consists of a number of "stations," each of which addresses a particular backcountry concern expressed in the station heading. Illustrations are used to highlight, and often contrast, key elements of the station topic. Below each station's illustrations is a challenge to the participant in the form of questions or a scenario regarding the topic. There are two versions to the Skills Trail. Version one is the most challenging of the two and requires "station items" (props). Version one works best when guided by a facilitator. Version two does not require station items and can be self guided. Handouts and information for both versions are contained in this guide and may be photocopied as needed. Have fun!

Materials:
- Skills Trail Posters:
    - "Pre-travel: Destined to Succeed"
    - "Pack a Pack: Hard Wear"
    - "Fires or Stoves: A Hot topic"
    - "Camp: A Site to Behold"
    - "Sanitation: When Nature Calls"
    - "Au Naturel: Compost Naturalization"
    - "Wet & Wild: Is that H2O Really Safe?"
    - "Horse Travel: Good Horse Sense"
- backpack packed with a few items of clothing, dried foods such as beans or instant mashed potatoes repackaged plastic bags, and a bottle of biodegradable soap
- stove and fuel bottle
- small roll of toilet paper and a trowel
- lightweight backpacking tent
- Books: NOLS Cookery Wilderness Ranger Cookbook

Duration: 30 minutes to set up, 45 minutes to conduct

Location: outdoors, interesting terrain preferred

Procedure:
Identify a reasonably large outdoor site ahead of time. There aren't too many requirements of the site, but if you can actually take a hike into interesting terrain it adds to the activity. Establish the stations listed above and post the appropriate poster at each. Pitch the tent at the "Campsite Selection" station, and try to locate this on some resilient vegetation (e.g.

LEAVE NO TRACE FIELD EXPERIENCE

Procedure continued:
grass), or at an established campsite. Locate the stove and fuel bottle at the "Fires and Stoves" station. If there is an old fire ring in the area, that is a good place for the "Fires and Stoves" station. At the "Human Waste Disposal" station, dig a cat hole into organic soil and leave the toilet paper and trowel next to it. Be sure the cat hole is at least 200 feet away from a water source such as a creek. If you are working with wheelchair bound students, place demonstration materials on a table at wheelchair height, 3 feet to 3 feet, 6 inches.

Now you are ready for the hike. Ask one of the students to carry the backpack, and trade off periodically, so that several students have the opportunity to carry it.

1. Pre-travel—Destined to Succeed:

Station Theme: Experienced campers plan their trips.

Resource Issues: Well-planned trips result in good decisions that help reduce resource damage.

Station items:

- topographic maps
- compass
- manual with hints for map reading
- paper
- pencil

2. Pack a Pack—Sole Food:

Station Theme: Good meal planning helps reduce weight and trash.

Resource Issues:

- unsightly and unsanitary trash from poorly planned meals
- food scraps that contribute to the poor diet of wildlife
- potential water pollution
- overloaded packs lead to fatigue and poor decision making

Station Items: sole food list from cook books, food tubes, dry cereal, oatmeal, powdered milk, milk carton, honey, syrup, pancake mix, peanut butter and jelly, mayonnaise jar, tuna can, tomato sauce, paste with dry sauce mix, canned stew, dried fruit, foil drinks, dry drinks, soup cans, dry soup, rice, bread sticks, crackers, cheese, weenies and beans, cups of cereal, etc.

Procedure continued:

3. **Pack a Pack—Hard Wear:**

   Station Theme: Most of us carry too much gear into the backcountry.

   Resource Issues: Carrying too much often leads to trash being left behind.

   - Heavy packs cause campers to reach destinations late and make poor campsite choices.
   - Some equipment, like saws and hatchets, inevitably result in damage to trees and vegetation.

   Station Items: hard wear list from guide book, hatchet, backpack saw, food tubes, collapsible jug, water pump, tent, stove, sleeping bags, pillow, blanket, tarp, cook kit, one pot and pan, utensils, small jackknife, cups, bowls, plates, trowel, clothing, radio, garbage bag, toiletry...use imagination!

4. **Fires or Stoves—A Hot Topic:**

   Station Theme: Deciding how to cook your meals may prevent or cause damage to the land.

   Resource Issues: Fires can kill vegetation and sterilize soil.

   - Fires can leave unsightly scars and contribute to the expansion of bare ground.
   - Branches and trees used for firewood provide wildlife habitat and also decay into topsoil. Breaking branches from trees also strips an area of its unspoiled character.

   Station Items: Backpack stove, fuel bottle, branches of the proper size, perhaps even an entire fire circle showing the wrong way to build a fire with charred rocks and trash in the pit.

5. **Camp—A Site to Behold:**

   Station Theme: Choosing a campsite that will minimize your impact is one of the most important decisions you will make.

   Resource Issues: Campsite selection impacts vegetation, wildlife and the solitude of other visitors.

   Station items: several photographs of campsites in different conditions, paper and pencil

6. **Sanitation—When Nature Calls:**

   Station Theme: Disposal of human waste demands careful decision making.

   Resource Issues: Fecal waste can spread disease, pollute water, and is unsightly.

   Station Items: toilet paper and trowel, pencils and paper for ideas...

7. **Au Naturel: Campsite Naturalization:**

   Station Theme: Breaking camp requires more than simply picking up your litter.

LEAVE NO TRACE FIELD EXPERIENCE

Procedure continued:

Resource Issues: Encouraging people to choose heavily used sites confines impacts to small areas.

- Camouflaging sites that should not be used again prevents campsite proliferation.
- Proliferation of campsites leads to loss of vegetation, erosion and greater impacts on wildlife and other visitors.

Station items: Photographs of campsites in different conditions or, for variety, set up actual campsites with rocks, ash and litter (for a fire circle); duff and pine needles (for rehabilitation).

8. Wet & Wild—Is that H_2O Really Safe?:

Station Theme: Wild water should not be considered fit to drink until it has been properly treated.

Resource Issues: Surface water from rivers and creek can carry disease.

Station items: iodine tablets, stove, water purification filter.

9. Horse Travel—Good Horse Sense:

Station Theme: Packing with animals requires good horse sense.

Resource Issues:

- Repeated trampling by stock can destroy vegetation.
- Pack animals permit equipment to be brought into the backcountry which can lead to high impact camping practices.

Station items: Webbing for tree savers, hitch line (high-line), hobbles, picket, equipment (Dutch oven, extra line, heavy gear, light gear, etc.), photographs of horse damage, easy boot.

Credits:

- Wasatch Cache National Forest—*Backcountry Skills Posters and Facilitators Guide*
- The primary references here were the Forest Service brochure FS-521, and the book, *Soft Paths*.
- For more in-depth treatment of selected topics, see:

  The Wilderness Educator, Cockrell, D. (1991), Merrillville, IN: I.C.S. Books.

  Wilderness Medicine, Forgey, W. (1987), Merrillville, IN: I.C.S. Books.

Evaluation / Follow-up / Extension

- Students can create new event and solution cards for "Will You Make It?" game.
- Assign students to design a Wilderness horsepacking trip. Develop a plan and calculate rations for your stock. Find out what type of feed you will need to pack (pellets, weed seed free hay, etc.) to supplement forage opportunities on your trip. Remember to apply LNT principles to this trip!
- Students will organize and teach the "Skills Trail" for other students.
- Conduct the Project Wild activity, "What Did Your Lunch Cost Wildlife"?
- Bring a properly packed backpack to class. Demonstrate and discuss how and why items are placed where they are. Explain that the pack should weigh approximately 1/3 of our body weight. If you are preparing for a backcountry trip, ask students to weigh and chart information to see if they're able to apply proper packing principles.
- Present a bear-resistant food container or pannier and discuss proper food containment techniques.

Career Options: outdoor trip leader, commercial outfitter and/or guide, naturalist

References:

- *Teaching Leave No Trace, Activities to Teach Responsible Backcountry Skills,* U.S. Forest Service and Bureau of Land Management.
- *The Backcountry Classroom, Lessons Plans for Teaching in the Wilderness,* Jack K. Drury and Bruce F. Bonney
- *Wilderness and Land Ethics Curriculum, K-8,* Arthur Carhart National Wilderness Training Center.

Teacher Checklist for Planning Field Experience

NOTE TO THE TEACHER/OUTDOOR LEADER:

Listed below is a series of questions you can review before teaching the lessons. Careful planning for a successful field experience is essential for student safety and a positive outcome.

- Is the special project relevant to the discipline objectives of the class/program?
- How does the project fit into the curriculum? Have the expected learner outcomes from accomplishing the project been established?
- What are the interdisciplinary connections?
- Is the project relevant to the students' personal experiences?
- Is the project student-driven?
- Will student motivation and ownership be generated by undertaking the special project?
- Do students possess the cognitive and skill levels necessary for accomplishing the project?
- Will the project include a diversity of learning techniques?
- Have the means of student evaluation been determined?
- Are there any legal considerations or potential insurance problems?
- Will students need to leave the school grounds to complete their special project?
- What special arrangements will need to be made? (Transportation, special passes, parental permission, guest lecturers, special facilities/space, use of special equipment such as computers or telephone, volunteers, chaperones, etc.)
- Has the time frame for the special project been outlined? (When will the students work on their special project? Will students need time outside of class?)
- Will any publicity need to be generated for the special project? If so, have the means to publicize the project been determined?
- In the case of long-term projects, who will be responsible for sustaining the project after the original participants have left?
- Have you contacted the appropriate administrative organization? What special restrictions apply? Are they available to make a presentation to the group?

Activity 3: Developing a "Total Food Planning" List

STUDENT TEACHER HANDOUT

"Elements to Consider When Planning a Trip

One of the most important **Leave No Trace** (LNT) principles is: **Plan Ahead and Prepare**. Adequate trip planning and preparation helps you, accomplish trip goals safely and enjoyably while minimizing impacts on the land.

Seven Elements to Consider When Planning a Trip:

1. Identify and record the purpose and goal (expectation) of your trip.
2. Identify the skill and ability of trip participants.
3. Select a destination to match your purpose, goal, skills, and abilities. Remember, you're only as strong as your weakest member!
4. Gain knowledge of the area you plan to visit.
5. Choose equipment and clothing to ensure safety and the likelihood that you'll **Leave No Trace.**
6. Plan trip activities to reinforce your purpose, goals, skills, and abilities.
7. Evaluate your trip after you're back home and note changes you will make next time.

Other Elements to Consider When Planning a Trip:

- weather
- terrain
- regulations/restrictions
- private land boundaries
- average hiking speed of group
- anticipated food consumption (Leftovers create waste which leaves a trace!)
- group size (Does it meet regulations, trip purpose, and Leave No Trace criteria?)
- Strive to practice all **Leave No Trace** principles.

Meals

Meals are an important element to trip planning that have a profound effect on the group attitude in a backcountry. Benefits of good meal planning result in: reduced pack weight, reduced dependence upon campfires for cooking, lighter loads and less garbage. Most food can be removed from commercial packaging and placed in sealable bags before packing into your backpacks.

Activity 2: Will You Make It?

Event Card ?	**Solution Card !**
BLISTERS! You have a nasty blister and can no longer carry your pack. You are not even sure you can walk to your campsite.	An adhesive felt-like material acts like a second skin and can be applied to the feet or other areas of human skin to prevent rubbing. Always carry this with you AND break in new footwear BEFORE a trip.
Event Card ?	**Solution Card !**
LIGHTNING! A storm is quickly blowing into your area. From your vantage point high on the trail you can see lightning. You estimate you have about five minutes before the storm reaches you.	Before you left on your trip, you researched safety. You remember that lightning is attracted to the highest point and that water and metal conduct the electrical charge. You take off your metal frame pack, stay away from puddles of water and choose a low spot away from the tallest trees.
Event Card ?	**Solution Card !**
PACK WEIGHT! Your pack did not feel heavy when you left, but now you can hardly move. You're so tired you would just as soon sit right down and not walk another step!	Too bad. Your heavy pack made it impossible to hike fast. You find a campsite for the night, but you never made it to your destination. Your pack's weight should be 1/3 of your body weight. Weigh your packed backpack on a scale BEFORE you leave. Choose what to leave behind. Some items, like cook kits, may be used by several people and the contents divided among the packs.
Event Card ?	**Solution Card !**
STEEP TRAIL! Your hike is three miles long and gains 1000 feet of elevation for every mile. This is steep. You must reach camp before dark. Everyone is walking very slowly because it is so steep.	You believe in planning ahead. You looked at a map and talked to the agency that manages this trail, so you were aware it was steep. Realizing that people hike an average of two miles an hour on flat terrain, you figured flat-terrain hiking time of 1 1/2 hours for the three-mile trail and doubled it to account for the steep elevation gain. You have plenty of time to reach camp before dark.

Will You Make It? **Travel Cards**

Activity 2: Will You Make It?

Event Card ?	Solution Card !
PRIVATE PROPERTY! Your group is walking along a trail when suddenly in front of you there is a fence with a "No Trespassing" sign.	Your group leader pulls out a statement signed by the owner of the private property giving permission to cross the private land. A review of maps revealed this private property, and a couple of phone calls resulted in the signed statement.
Event Card ?	**Solution Card !**
WATER! Your group brought two quarts of water per person, but your hike has been very hot and now everyone is low on water. You can't boil water because a fire ban is in effect and you don't have a stove because you were only going on a hike.	After another hour of an uncomfortably dry hike, you run across a prepared hiker who pulls out a water filter designed to remove bacteria from wild water sources. After taking a break on the rocky shore of a small pond, you filter water and have enough to finish the hike.
Event Card ?	**Solution Card !**
CAMPFIRE BAN! You have no stove and the area you came to visit has been heavily used and does not permit campfires. It's dinner time and everyone is hungry.	Because this was only an overnight trip, someone suggested you bring prepared food for dinner. As the sun begins to set, everyone gathers on a rock outcrop near camp and pulls out a sandwich, piece of fruit, and a snack for dessert. As darkness falls the group watches the stars appear and tells stories about the shadows in the night.
Event Card ?	**Solution Card !**
CAMPSITE! When you arrive at your destination, both campsites recommended by friends are being used. It will be dark soon. There is a little time to search for another site. You are tempted to camp right on the trail, even though that doesn't follow good Leave No Trace ethics.	Your group leader hiked to this area two weeks ago in anticipation of your trip and found three perfect campsite options. After following your leader for another ten minutes you move off trail to a campsite with big flat rocks to sit on and a great view of the canyon.

Will You Make It? **Travel Cards**

STUDENT/TEACHER HANDOUT
Nutrition and Rations Planning

A. FOOD PLAYS IMPORTANT ROLES IN:

1. **Staying healthy**

   Keeping well-nourished plays an instrumental role in fighting illness and disease.
2. **Building and repairing body tissue**
3. **Attitude**

   Without good nutrition, disposition and attitude deteriorate rapidly.
4. **Energy**

   Food provides the energy that allows us to take part in physical activities.
5. **Mental alertness**

   Thought processes and decision-making ability deteriorate without good nutrition.

B. SPECIFIC NUTRITIONAL NEEDS

1. **Calories**

a. A calorie is a unit of heat used to measure the energy value of food. It takes 1 calorie to raise 1 gram of water 1 degree centigrade.

b. Individual daily caloric needs range from approximately 1,800 per day for a sedentary individual to over 6,500 for an expedition member in severe weather.

c. In general, individual daily caloric needs for wilderness travelers range between: (1) 2,800 and 4,000 in summer. (2) 3,800 and 6,000 in winter.

2. **Carbohydrates**

a. Carbohydrates provide short term energy.

b. They should make up approximately 60% of an individual's diet.

c. Carbohydrates are found in starches and sugars such as:

   (1) Pastas (macaroni, noodles, spaghetti)
   (2) Rice
   (3) Potatoes
   (4) Drink mixes
   (5) Candy
   (6) Fruit

3. **Fats**

Activity 3: Developing a Total Food Planning List

STUDENT/TEACHER HANDOUT

Nutrition and Rations Planning continued:

a. Fats provide long term energy.

b. They should make up approximately 12.5 - 20% of an individual's diet. During colder weather, increase to 25 - 30% of diet.

c. Fats are found in:

(1) Cheese

(2) Nuts

(3) Vegetable oil

(4) Margarine

4. **Protein**

a. The body uses protein to provide for the building of cells and tissue such as skin and muscles.

b. It should make up approximately 15 - 20% of an individual's diet.

c. Proteins are made up of 22 amino acids. Of these 22, all but eight are produced in our bodies. These eight must be obtained through proteins in food.

d. Complete proteins vs. incomplete proteins

(1) Complete proteins

These include all eight of the essential amino acids that the body cannot produce. Therefore, they provide a full complement of protein. Examples include:

(a) Meats (pepperoni)

(b) Fish

(c) Soy products (soy flour, soy nuts)

(2) Incomplete proteins include some, but not all eight of the essential amino acids. Therefore, they do not provide a full complement of protein. Ex amples of incomplete proteins include:

(a) Cereals (oats, Cream of Wheat, Wheatena)

(b) Vegetables and fruit

(c) Legumes (beans, peanuts, lentils)

(3) Incomplete proteins can be made complete by combining two or more foods (e.g., beans and vegetables) together in the same meal. Although this usually happens naturally, it's helpful to be aware of this to insure that complete proteins are consumed regularly.

5. **Vitamins and minerals**

Activity 3: Developing a Total Food Planning List

STUDENT/TEACHER HANDOUT

Nutrition and Rations Planning continued:

If participants consume a variety of foods and the recommended high number of calories, vitamin and mineral intake is generally adequate. Supplemental vitamins and minerals are usually unnecessary.

6. **Water**

Water is a critical nutritional element.

a. Water aids in digestion.
  (1) It keeps cells healthy
  (2) It regulates body temperature
  (3) It helps to carry wastes out of the body

b. Times when the body is more susceptible to dehydration:
  (1) Strenuous activity (water is lost through perspiration)
  (2) Higher altitudes (water is lost through increased respiration in drier air)
  (3) Cold weather (water is lost through respiration and perspiration)

c. A minimum of 2-4 quarts in summer and 3-4 quarts in winter should be consumed each day to prevent dehydration.

C. FOOD PLANNING CONSIDERATIONS

Depending on the objectives and length of the trip, the following criteria should be considered:

1. **Energy content**

The number of calories supplied by a food item in relation to its bulk and weight.

2. **Nutritional balance**
3. **Bulk and weight**
4. **Spoilage**

The risk of food spoiling varies with the season and region.

5. **Expense and availability**

Is it available, and if so, can the group afford it?

6. **Ease of packaging and handling**

Activity 3: Developing a Total Food Planning List
STUDENT/TEACHER HANDOUT
Nutrition and Rations Planning continued:

a. Package food in reusable plastic bags or containers. Make sure that you carry all of these out, since they will not easily decompose.

b. Make sure all foods can be packaged to prevent spilling.

c. If camping in bear country, select foods that do not have strong scents or odors.

7. Variety

a. The longer the trip, the more important this becomes as a morale booster. Few people want to eat the same thing day after day.

b. The more variety, the better the chance of appealing to everyone's food tastes.

8. Preparation time

Consider preparation time when selecting foods. Decide on a moderate amount of cooking time (e.g., 20 minutes) and select foods accordingly.

9. Supplementary wild foods

a. Are they available?

b. Can they be harvested legally?

c. Are group leaders knowledgeable enough to prevent accidental poisoning?

d. Can the foods be harvested without impacting the environment (will the plants chosen naturally replenish within a reasonable time)?

D. RATION PLANNING

(See next page)

1. "Total Food Planning"

a. Definition

This process is based on determining caloric needs and ensuring that the group has enough food to meet caloric needs while staying within weight and budget constraints .

b. Planning criteria

(1) Caloric needs--During summer months, between 3,200 and 3,750 calories are planned per person per day, depending on activity level and weather.

(2) Weight needs– Approximately 2 pounds of food per person per day is required during summer months.

(3) Budget needs– Nutritious meals can be provided for between $2.50 and $4.50 per person per day.

Activity 3: Developing a Total Food Planning List
STUDENT/TEACHER HANDOUT
Nutrition and Rations Planning continued:

c. Advantages of "Total Food Planning"

(I) A large variety of foods can be used, allowing for an endless variety of meals.
(2) Cooking can be spontaneous and creative.

(3) It eliminates the need to plan specific meals. Individuals can eat what they want, when they want, and, in general, should have enough food for the trip.

(4) By minimizing pre-mixed meals and cooking from scratch, financial savings can be realized.

2. How "Total Food Planning" works

a. Calories

Multiply the number of people (P) going on the trip times the number of days (D) of the trip times the minimum number of calories (C) to be brought per person per day. This is the minimum number of calories needed for the trip (e.g., 12(P) X 33(D) X 3500(C) = I,386,000).

b. Weight

Multiply the number of people (P) going on the trip times the number of days (D) of the trip times the maximum number of pounds (P) to be brought per person per day. This is the maximum number of pounds of food to be brought on the trip (e.g., 12(P) X 33(D) X 2(P) = 792).

c. Cost

Multiply the number of people (P) going on the trip, times the number of days (D) of the trip times the maximum amount of money ($) to be spent per person per day. This is the maximum amount of money to be spent on food for the trip (e.g., 12(P) X 33(D) X $3.25 = $1287).

d. Working with the results

Use these figures and the planning considerations to develop a food list that meets calorie, weight, and cost criteria.

Activity 3: Developing a Total Food Planning List
STUDENT/TEACHER HANDOUT
Nutrition and Rations Planning continued:

E. COMPUTERS AND THE FOOD PLANNING PROCESS

Spreadsheet software can be used to save time and anguish, making food planning easier.

1. A shopping list can be created that meets minimum caloric needs and maximum pound and cost parameters. Once the data base is established, at the press of a button the computer will do all the computations and generate food lists.
2. A nutritional analysis of the food selected for the trip can be done.

F. INSTRUCTIONAL STRATEGIES & MATERIALS:

Activity:
Have participants develop a rations plan and use it during a trip.

PRINCIPLE #1

Plan Ahead And Prepare

BEFORE YOU GO

Check with land management agencies before beginning a trip. Know the regulations, inherent risks and special concerns for the area you'll visit.

- Visit the backcountry in small groups.
- Avoid popular areas during times of high use.
- Choose equipment and clothing in subdued colors.
- Always take a topographic map and compass.

PRINCIPLE #1

Plan Ahead And Prepare

PACK A PACK

Over-loaded packs lead to fatigue and poor decision making. Well organized meals reduce pack weight.

- **Instructions: Look at the items at this station. What types of food are lightweight and produce a minimum amount of trash?**
  - **✓Dry cereal**
  - **✓Powdered milk**
  - **✓Dehydrated dinners**
  - **✗Bacon & eggs**
  - **✗Canned soup**
  - **✗Tin-foil dinners & stew**

Hints: Anything you bring with you should be eaten or taken home, including leftovers. Repackage food into reusable containers and baggies to reduce waste.

PRINCIPLE #2

Camp And Travel On Durable Surfaces

Concentrate Use And Impacts In Heavily Used Areas

ON THE TRAIL

Stay on designated trails. Walk in single file in the middle of the path. Do not shortcut switchbacks.

- Step to the downhill side of the trail and talk softly when encountering pack stock. Avoid waving arms or making sudden gestures.

AT CAMP

- Choose a worn, legal campsite at least 200 feet (70 adult steps) from lakes and streams and away from other occupied campsites. In National Parks, campers may be required to camp in established sites.
- Restrict activities to the area where vegetation is compacted or absent. Leave the site clean and attractive.

National Forest

PRINCIPLE #2

Camp And Travel On Durable Surfaces

Spread Use And Impacts In Pristine Areas

OFF THE TRAIL

When traveling cross-country, spread out rather than follow the same route. Choose the most durable surfaces available: rock, gravel, dry grasses or snow.

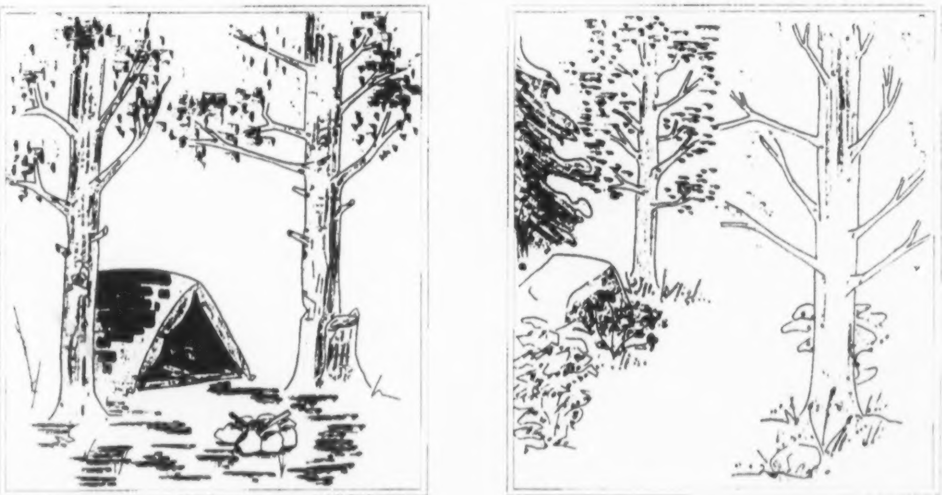
- Do not mark your route with rock cairns, tree scars or ribbons.

AT CAMP

- Choose a durable, undisturbed site to camp on.
- Avoid camping where impact is just beginning. Allow these places to recover.
- Disperse activities in camp. Separate tents from the cooking area and avoid making new paths. Naturalize the site before you leave so others will pass you by.

PRINCIPLE #2

Camp And Travel On Durable Surfaces



CAMPSITE SELECTION

Look at these drawings of heavily used and pristine campsites. Think about how you would select a campsite based on the following factors:

- How popular is the area (heavily versus lightly used)?
- How large is your group (large versus small)?
- How skilled is your group at no trace camping (high or low skill level)?
- Are you planning to use a stove or campfire?

Hints: For each of these two sites think about whether or not you want to encourage other groups to camp here. How would you do this?

National Forest

PRINCIPLE #3

Pack It In, Pack It Out

Pack out leftover food; never bury it. Pack everything that you bring into the backcountry out with you.

- Pack only what you need for your trip.
- Hang food or use bear resistant food containers in bear country. This protects wildlife and your food.
- Pick up all spilled foods. Pack out all trash, yours and others'.

PRINCIPLE #4

Properly Dispose of What You Can't Pack Out

Use a small trowel to help dig a "cathole". Dig catholes 6 to 8 inches deep and at least 200 feet from water, camp or trails. Cover and disguise the cathole when finished.

- Use white, unscented, biodegradable toilet paper sparingly and pack it out.
- To wash yourself, carry water 200 feet away from streams and lakes, and use a small amount of biodegradable soap.
- After washing your dishes, carry strained dish water 200 feet away from camp and scatter.

PRINCIPLE #4

Properly Dispose of What You Can't Pack Out

Disposal of solid human waste can be an uncomfortable topic, but it demands careful decision making since fecal waste can spread disease. Disposal should:

- ✓Minimize the chance of finding the waste
- ✓Minimize the chance of water pollution
- ✓Maximize the chance for decomposition

Instructions: Following these objectives, choose the disposal method best suited to different backcountry situations.

1. Toilet 2. Latrine 3. Cathole

Hints: How big is your group? Is the area popular? Where is the nearest water? How should you dispose of toilet paper?

PRINCIPLE #5

Leave What You Find

Treat our natural heritage with respect. Leave plants, rocks, historical and archaeological artifacts as you find them.

- Good campsites are found, not made. Altering a site should not be necessary.
- Let nature's sounds prevail. Keep loud voices and noises to a minimum.
- Control pets at all times. Remove dog feces.
- Do not cut boughs, build structures, furniture or dig trenches around tents.
- Enjoy wildlife at a distance. Give them adequate space particularly near waterholes and during birthing and nesting seasons. Do not feed or disturb animals.

National Forest

PRINCIPLE #6

Minimize Use And Impact Of Fire

STOVE OR CAMPFIRE

Campfires can cause lasting impacts to the backcountry. Always carry a lightweight stove for cooking. Enjoy a candle lantern instead of a fire.

- Where fires are permitted, use established fire rings, fire pans, or mound fires. Do not scar large rocks or overhangs.
- Gather sticks no larger than an adult's wrist.
- Do not snap branches off live, dead, or downed trees.
- Put out campfires completely. Remove and pack out all unburned trash from fire rings. Scatter the cool ashes over a large area well away from camp.

PRINCIPLE #6

Minimize Use And Impact Of Fire

STOVE OR CAMPFIRE

Deciding how to cook your meals may protect or damage the land. Should you use a stove or campfire?

- Instructions: List the pros and cons of stoves and campfires, and answer the following questions:

1. How many stoves would you need for your group?
2. If you decide to use a fire, what size and type of wood would you collect?
3. How big a fire will you build? Where do the ashes go?
4. Do you know how to build a fire pan or mound fire?

Hints: How do campfires affect the environment?

National Forest

HORSE SENSE

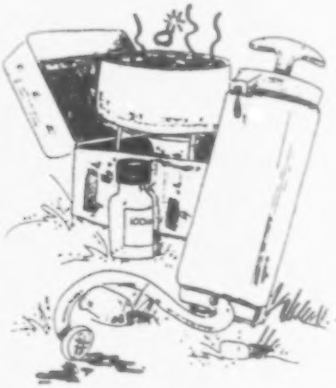
Horse Travel

Take the minimum number of animals necessary. Fewer animals mean less resource damage to trails and campsites.

- Use a highline or electric fence to secure stock and reduce damage from pawing or cribbing.
- Horses should never be tied to trees for extended periods.
- On the trail, remove obstacles instead of skirting them to prevent "go-around" trails.
- In some areas, grazing is limited or restricted by regulations. To reduce the spread of noxious weeds, all supplemental feed should be certified weed seed free.

WET & WILD

Is The Water Clean?



Most health officials agree that open water should not be considered fit to drink until it has been properly treated. Just because it's clear doesn't mean it's clean!

- Instructions: What are the pros and cons for each method of water purification? What method would you choose? Why?
  - ✓ Chemical treatment (iodine or chlorine)
  - ✓ Water purification through filtration
  - ✓ Boiling (using a stove prevents a smoky taste)

Hints: Consider elevation, ease of use, cost, effectiveness and fuel consumption. In addition, do you know what "giardia" is, where it is found and how it is spread?

Lesson 2: **A Wilderness Backpacking Trip**

Teacher Checklist for Planning Field Experience

NOTE TO THE TEACHER/OUTDOOR LEADER:

Listed below is a series of questions you can review before teaching the lessons. Careful planning for a successful field experience is essential for student safety and a positive outcome.

- Is the special project relevant to the discipline objectives of the class/program?
- How does the project fit into the curriculum? Have the expected learner outcomes from accomplishing the project been established?
- What are the interdisciplinary connections?
- Is the project relevant to the students' personal experiences?
- Is the project student-driven?
- Will student motivation and ownership be generated by undertaking the special project?
- Do students possess the cognitive and skill levels necessary for accomplishing the project?
- Will the project include a diversity of learning techniques?
- Has the means of student evaluation been determined?
- Are there any legal considerations or potential insurance problems?
- Will students need to leave the school grounds to complete their special project?
- What special arrangements will need to be made? (Transportation, special passes, parental permission, guest lecturers, special facilities/space, use of special equipment such as computers or telephone, volunteers, chaperones, etc.)
- Has the time frame for the special project been outlined? (When will the students work on their special project? Will students need time outside of class?)
- Will any publicity need to be generated for the special project? If so, has the means to publicize the project been determined?
- In the case of long-term projects, who will be responsible for sustaining the project after the original participants have left?
- Have you contacted the appropriate administrative organization? What special restrictions apply? Are they available to make a presentation to the group?

LESSON 2 • **A Wilderness Backpacking Trip**

Objectives:
Students will:

- learn backpacking skills, wilderness values and management
- participate in a multi-day experience in a Wilderness or backcountry area

Background:
Planning and experiencing an extended backcountry trip is an excellent opportunity to learn about Wilderness. Students and teachers will travel by foot carrying all their provisions in backpacks. As they travel and camp, students will learn and explore many aspects of Wilderness education encompassed in this curriculum. The trip will expose students to the elements of Wilderness living by: sleeping on the ground, drinking from creeks, traveling in all types of weather and reflecting in purposeful solitude. Wilderness education will unfold each day of the trip and prepare students to take home what they have learned and to share this with other students, family members, friends, and others in their community.

The class should have some introduction to Wilderness prior to a backpacking trip. The experience itself will bring about an invested interest and concern regarding Wilderness management and values which can be further explored back in the classroom. Read and study chapters from the "Soft Paths" book that are appropriate "Leave No Trace" practices for the area you will be visiting.

Activity 1: Planning a Wilderness Backpacking Trip

Materials:

- student handout: "Backpacking Equipment List," page 96.
- Other materials are referenced in lessons within subjects and strands of the curriculum
- LNT Outdoor Skill and Ethics booklets

Duration: See specific lesson

Location: Classroom and outdoors

Procedure:

1. Make copies of the "Backpacking Equipment List Student Handout" and distribute to students. Spend time thoroughly reviewing this list several times before the trip.

2. A number of topics to cover **BEFORE** a backpacking trip should be an introduction to Wilderness. Some suggestions include:

- **SOCIAL STUDIES** - Conduct lessons on leadership skills in the PERSPECTIVES Strand, pages**70-76.

LEAVE NO TRACE FIELD EXPERIENCE

Procedure continued:

- **HISTORY** - Wilderness Act and History of explorers to the Wilderness you will visit, lessons can be found in OVERVIEW , page**1-19, and in the PERSPECTIVES Strand, pages**29-38; and the video and discussion questions for the video, "Battle for Wilderness, pages**39-46.

- **ENGLISH** - Read "Sand County Almanac" by Aldo Leopold, with accompanying lessons found in the PERSPECTIVE Strand, PAGES**23-28; and video and discussion questions for "Wild By Law", OVERVIEW Strand, Pages**1-4.

- **THE ARTS** - Landscape art work, lessons found in the AESTHETICS Strand, pages**1-3; and the PERSPECTIVES Strand, pages**16-19.

- **SCIENCE** - Introduction to ecosystems, lessons found in the ECOLOGY Strand, pages**1-4, CONNECTIONS Strand, pages**11-19; and pages**30-41, and the STEWARDSHIP Strand, pages**52-66. Learn about photography in the FIELD EXPERIENCE Strand, pages**67-68

- **MATH** - Measure the size and scale of the National Wilderness Preservation System, lessons found in the OVERVIEW Strand, pages**1-11. Pre-trip planning lessons are found in the LNT Strand, pages**25-45.

3. A number of topics to cover **DURING** the backpacking trip can be combined. Some suggestions include:

- **SOCIAL STUDIES** - Mapping historical use patterns of the lands you are traveling on. See lessons on cultural resources in the CONNECTIONS Strand, PAGES**37-43.

  Orienteering (map and compass skills), ECOLOGY strand, pages**26-37. See lessons in the "The Backcountry Classroom" book.

- **HISTORY** - Conduct a town meeting to discuss Wilderness management issues with students representing diverse representatives of a local community, STEWARDSHIP Strand, pages**60-64. Invite a Wilderness ranger to give a talk to your class on the history of the area and its management.

- **ENGLISH** - Write short stories on the biodiversity in the ecosystems observed. See journaling lesson in the AESTHETICS Strand, pages**15-18.

- **SCIENCE** - Conduct a research project on human and resource impacts, STEWARDSHIP Strand, pages**5-8.

Procedure continued:

4. **RETURN TO THE CLASSROOM** and reinforce lessons learned in the field. Expand into other activities in each subject area by conducting lessons from the Wilderness curriculum. Some suggestions include:

- **SOCIAL STUDIES** - Compare field mapping of observed historical use patterns to actual wilderness plans prepared by the agency. Lessons can be found in the CONNECTIONS Stand, pages**37-43. Learn the land management agencies systems for determining user capacities in Wilderness. See recreation use lesson in CONNECTIONS Strand, page**44. Interview land agency staff to determine who uses the Wilderness. Look at socioeconomic class, ethnicity, age, etc. What kind of education can the students provide to the public? See lessons in PERSPECTIVES, pages**23-25; and the STEWARDSHIP Strand, pages**57-61.

- **THE ARTS** - Produce a photo album, video or article for the media documenting the trip and classroom projects about Wilderness. See lessons in CONNECTIONS Strand, pages**20-29.

- **SCIENCE** - Compile research data and provide information on results to the land management agency, see the OVERVIEW Strand lesson on research, pages**5-8.

- **MATH-** Teach camping skills to other classes. See lessons in LEAVE NO TRACE (LNT) Strand, pages**25-45

Activity 2: Activities for a Backpacking Trip

Duration: See specific lesson

Location: Indoors or outdoors

Materials: See specific lesson

Procedure:

1. Listed in order below are lessons and activities to include on a three-day or longer backpacking trip.
2. When beginning the trip it is important to cover basic skills necessary to insure safety, group cooperation, leadership and skills for minimum impact travel and camping. These concepts are covered in lessons from the MATH section, pages**25-45.
    - How to pack and carry a pack
    - How to prevent blisters, dehydration and injuries
    - Water purification
    - Human waste treatment (cat holes according to "Leave No Trace")
    - Map reading
    - How to hike in a group by staying together (pacing) and communicating (leadership)
    - Campsite selection, shelter and kitchen set up, safe stove operations

LEAVE NO TRACE FIELD EXPERIENCE

Procedure continued:

3. Once the basic skills have been introduced, students can learn more advanced aspects of a backcountry experience. These concepts are covered in lessons from the MATH and SOCIAL STUDIES sections.

- Map reading, SOCIAL STUDIES, pages**26-31
- Minimizing use and impacts of campfires, MATH, pages**29-32

The remaining concepts can be learned from lessons from various subjects and strands.

- Solo and journal writing time, ENGLISH, Aesthetics Strand, page**15.
- Gourmet cooking and baking, "NOLS Cookery" and the "Wilderness Ranger Cookbook
- Readings from famous supporters of Wilderness before serving dinner, Wilderness Reader, "Wilderness Quotes" booklet, or "Words for the Wild, Trailside Reader" book

4. Toward the end of the trip provide time for reflection and putting closure on the experience. Lessons from various subjects and strands can be used.

- Solo and journal writing, ENGLISH, CONNECTIONS Strand, page**15.
- Group sharing to express what students have been learning, what they liked and didn't like, MATH, LNT Strand, pages**25-45.
- Make a list of goals for transferring the experience back into classroom. See "Teaching" and "Issues and Action" practicums in the SOCIAL STUDIES, FIELD EXPERIENCE Strand, PAGES**83-107
- A closing ritual with an emphasis on giving something back to the land or acknowledging specific efforts that contributed to making the experience as possible. See lessons from THE ARTS, AESTHETICS Strand, pages**1-8.

Evaluation/Follow-up/Extension

- Evaluate introduction classroom activities to determine if students are prepared for the backpacking trip.
- Evaluate the transfer of learning from the backpacking trip back into the classroom through continuation of projects and activities from the "Issues and Action" or "Teaching" practicum in this strand.
- Show "Soft Paths" video and complete discussion questions. Evaluate responses from discussion questions.
- Encourage students to play the game, "Oh Wilderness!" GAME to test their knowledge of the outdoors.

Career Options:

- Backpacking instructors for outdoor organizations like Outward Bound and National Outdoor Leadership School
- Backcountry and Wilderness rangers

References:

- *Wilderness Ways, The Colorado Outward Bound School Guide For Environmentally Sound Backcountry Travel*, Brian Litz and Lenore Anderson.
- *Soft Paths*, Bruce Hampton and David Cole.
- *The Backcountry Classroom, Lesson Plans for Teaching in the Wilderness*, Jack Drury and Bruce F. Bonney.

Activity 1: Planning a Wilderness Backpacking Trip

STUDENT HANDOUT • **Backpacking Equipment List**

I. Group Equipment List

1. tarps or tents
2. backpacking cook stoves (stove repair kit) and fuel
3. pots and frying pans with lids
4. large mixing spoon, spatula and ladle
5. "cat hole" trowel
6. first aid kit
7. maps
8. repair kit
9. 1 bottle of biodegradable soap
10. backpacks for all students
11. sleeping bags for all participants
12. sleeping pad

II. Individual Gear List

1. warm jacket (pile, bunting or wool)
2. warm sweater or wool shirt
3. polypropylene or wool zip T-neck
4. polypropylene or wool long johns
5. synthetic or wool winter hat
6. sun visor
7. maximum of 2 T-shirts
8. 1 pair of shorts
9. 1 pair of lightweight pants or wind pants
10. 3 pairs of wool socks and nylon or polypropylene liner socks
11. 3 pairs of underwear
12. swimsuit
13. 1 pair of wool gloves or mittens
14. 1 bandana
15. plastic water bottle (at least 1 quart)

LESSON 3 • Reflections on Wild Places— A Journal-Making Activity

Objectives:
Students will:

- produce a journal-like collection of items and written entries that reflects on their feelings about "natural things" and "wild places."
- express in writing at least one value they see in preservation of a wild place.

Background:
Journals have been kept by countless people throughout history. A journal is a tool for capturing thoughts, ideas, reflections, images, and feelings. Many naturalists have kept journals as they traveled and studied their environment. These journals are not limited to written entries of empirical data, but contain snatches of ideas, sketches, poems, even bits and pieces of an experience. Keeping a journal allows us to capture a moment or idea before it escapes us, gives us a chance to take a second look. A journal is a tool to help train all of our senses, to make us better observers. A journal is a record of ideas and information that may later give insight or answers to things we question or are curious about.

Journals can be creative; they can be factual; the best seem to be a combination of both. A log or diary is a journal, so is any kind of record of any part of a person's life. A photo album is a kind of journal (though the meanings and remembrances will be lost if never written down), a baby book or a scrap book can be journals.

People who have kept journals: Leonardo DaVinci, Albert Einstein, Charles Darwin, Margaret Mead, Rachel Carson, Aldo Leopold, Thoreau, Eleanor Roosevelt, Enos Mills, John Muir, Edward Abbey, and Annie Dillard. There is no wrong way to keep a journal.

Students will make written journal entries, photographic or artistic entries in a book-like format. Students might also make a tape of favorite wild sounds—taken from any source to keep in a pocket inside the back cover of their journal.

Activity 1: Setting the Stage

Materials: For teachers:

- example poems
- journal entries
- photographs
- artwork
- tape of natural sounds
- leftovers of nature (seed pod, feather, leaf or leaf skeleton, rock, crystal, interesting bit of weathered wood, etc.).

Materials continued: For Students:

- a folder (the kind that will hold paper) or notebook
- paper and pen
- anything else you want to use—for example—markers, drawing pencils, charcoal
- glue
- Zip-lock bags—anything goes

Duration:
variable, minimum suggested time frame: one week with at least 15 minutes per day of quiet time offered in class. Students will also need to work on the journal in their own time.

Location:
classroom, optional school sponsored field time/outside time, student choice for location(s) encouraged, inside or out

Procedure:
1. Introduce the concept of keeping a journal. Tell students that they will be working on discovering one new thing about the natural environment around them. Let them know they will need a notebook or scrapbook of some kind. Then let them think about it for a few days—make no demands, set no time limits at this point.

2. Some time later (after lunch, or a day or two) ask the students what they think of keeping a journal; ask them if they have already noticed themselves taking note of things around them. Did just knowing that they needed to discover something new about the environment make them look more closely?

If students are not enthusiastic about keeping a journal, share the background information and/or ask them to pick something they really enjoy knowing a lot about. For example: music, sports, a hobby, the intricacies of the lives of the characters of their favorite soap opera, a favorite video game, a favorite pet. Have them start their journal with approach number one.

3. A few suggestions on ways to begin their journal:

- The Favorite Thing Approach. Start with the thing you really enjoy knowing a lot about and write about it—use the "hot pen" technique-all the ink will melt out into one big blot: write anything that comes into your head, in any order, with no concern about spelling, sentences etc., for three minutes. After three minutes compare what you have written to any natural "wild" thing, a river, a mountain, a leaf, a coyote chasing its tail. Then draw an abstract little sketch, or find a photo, or add some color.
- The Five Senses Approach. Find a place where something catches your eye. Sit and observe, use of your five senses, touch, feel, hear, see, and taste. Record your observations and ideas, what did you notice, how did you feel about this place?

Procedure continued:

- The I Just Don't Feel Creative Approach. Become the scientist naturalist. Find a piece of anything; a rock, a plant, an animal, a brick, a piece of litter. Describe the item in detail, color, texture, weight, shape, measurements, enough detail that another person could identify, draw, or recreate the item you selected without knowing what it is. After you've finished your descriptions, try to determine the purposes of the characteristics you've recorded; why is it that color, what purpose does the texture serve? If ideas and reflections begin to flow...go for it, record them too. If they don't, it's okay, study and learning give insights into many other things. Recording the observations is the important part.
- The Imitate A Mushy-Flowery-Philosophical Poet Approach. Journals are great places to get a little silly and be creative. Do your version of Shakespeare's "description of a tree." Imagine yourself to be a minimalist; find five words that describe an object, but don't relate at all to each other, add an illustration. Outline a bunch of things that strike your fancy (hand, leaf, rock, caterpillar) and write a haiku inside it.

  Write a verse for the "ballad of the bull thistle" or anything else that would make a good (bad?) country song (or Arthurian ballad for that matter).

3. Encourage students to have the first few pages of their journals filled in one sitting— filled with anything. If you need a deadline for this, give them some lead time. The 15 minutes in class can be used for recalling notes, expanding on ideas, deciding where they might go to observe next, and after a few days, for voluntary sharing in small groups. You may even want to provide some artistic media they might not have access to otherwise; paints, adhesive plastic, a mortar and pestle for grinding leaves and other sources of natural pigments.

Activity 2: Journaling - Layers of the Landscape

Materials:

- Regional Natural History Guide
- journal
- pencil or pen
- landscape

Duration: 2 hours

Location: Outdoors

Procedure:

1. Have students find a spot they will be sitting in for the duration. They should be within a small area visible to the teacher (teachers discretion), and be alone, working independently.

2. Students will use the natural history guide to find the information. It is best to view a landscape that has "layers," so they see elevational changes or landscape changes.

The layers can be something like this:

- where you are sitting—your immediate environment, ten feet around you
- foreground—20 feet to 100 feet around you
- background—the farthest distance you can see

3. In a general overview of the landscape, have students describe the ecological and geological phenomenon in the landscape. Imagination is crucial here! Slope, sun, moisture, temperature can be imagined for the landscape.

4. Using the natural history guide, describe or at least note two plants, two animals, two birds and two species of trees for each of the layers of the landscape.

5. Have students sketch at least one tree, plant or the landscape they see.

6. The activity can be concluded by bringing the students together and having them share a part of all of their experience, including how it felt to be alone and quiet, thinking about the landscape.

Follow-up:

- Follow-up is a matter of choice. What other objectives did you as a teacher have for this exercise? Should you extend the time? Is the process still fresh? Are students sharing their ideas?
- An option: set a time to quit making entries, collect the journals for a week, return them to the students to read and make final entries. This final entry should include something they discovered about the world around them, about wild places, about their thoughts.
- Have them envision a wild place where they could go to live or pursue one of their ideas. They should describe this place. Have student share their place descriptions. Discuss where these places might be found. Are these places valuable—even if you may never get to go there?
- An option: have students research other journals. Have them find a quote they particularly appreciate and put it in the next to last page of their journal. Have them make their own quote on the last page.

Extensions:

- Have students listen to a tape of nature sounds. Have them write whatever the sounds make them think of. Listen to a tape of Aldo Leopold's writings, or Thoreau's. Have the students draw what the words bring to mind—remember drawings can be impressionistic.
- Have students make a tape of their own. Either from real sounds they tape outside (hard to do) or a composite of other tapes. It should be something that makes them feel like putting ideas in their journal or makes them feel like they are in one of their wild places.

Extensions continued:

- Have students decorate/design the outside of their journals—if they haven't already. Suggest that the cover be a kind of preview of what's inside. Compile a collection of poems, quotes, illustrations to be published in a small book (you may even want to let the class sell them to cover the cost at your Earth Day Celebration).

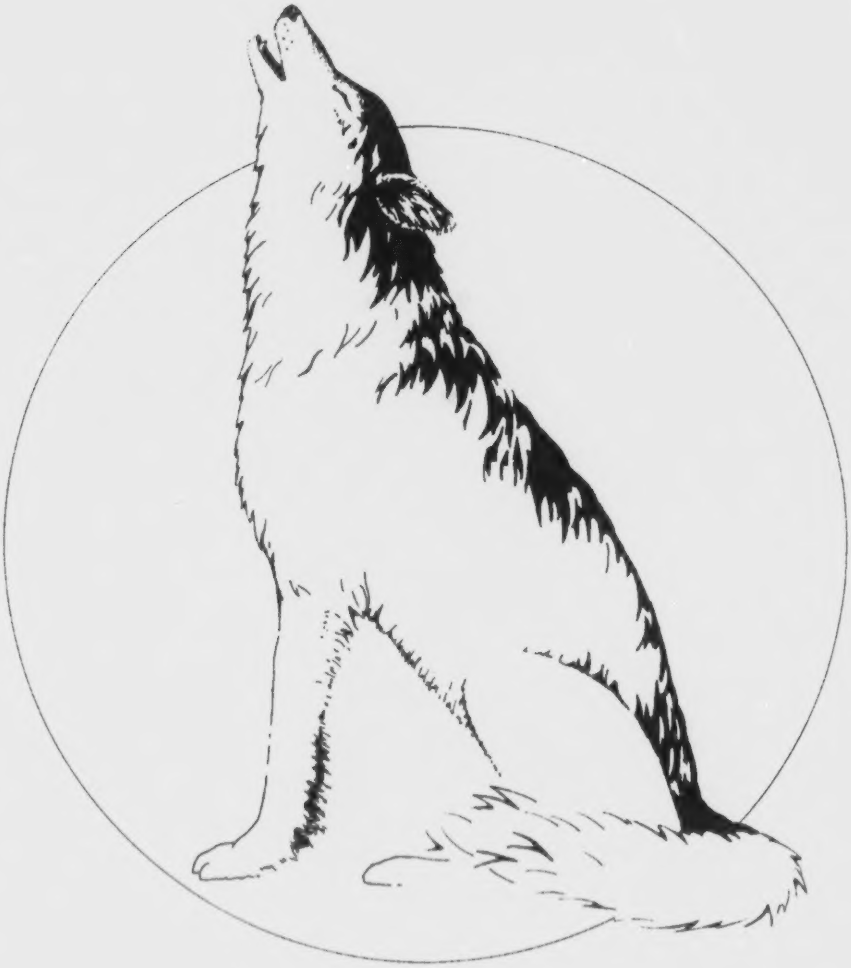
Career Options:

nature writer, journalist, naturalist, scientist, interpretation specialist

References:

- Hammond, W.F. 1993. "Creative Journal Keeping." A Workshop Handout, page 6. Bill Hammond, Natural Context, P.O. Box 07461, Ft. Myers, FL 33919. Project WILD. 1985.
- Project WILD, "Wild Words...A Journal Making Activity." Western Regional Environmental Education Council.

SOCIAL STUDIES



LESSON 1 • **Who Manages Wilderness?**

Objectives:
Students will:

- know what legally designated Wilderness is, what agencies protect and manage it, and the types of regulations with which Wilderness users must comply.

Background:
Students will gain a better understanding of Wilderness by looking at legislation that has been written to protect and manage it and at the agencies who apply the legislation. Through a variety of creative activities, students learn that four federal agencies are responsible for management of our public, federal lands and that in terms of human activity, legally designated Wilderness Areas have some restrictive land use regulations.

Location: indoors.

Activity 1: Legislation and Management

Materials:

- student handout: "Land Management Agencies and Their Mandates," found in the "Wilderness: An Overview" section of the curriculum, page 15.
- handout: "Management Challenges for Federal Agencies," page 105.

Duration: 1 class period.

Procedure:

1. Begin presentation by paraphrasing the following:
    - Wilderness is just one of the many official land use designations that can be placed on federally owned lands. Currently there are approximately 104 million acres in the National Wilderness Preservation System. This equals 15 percent of the federal public lands and 4 percent of the total United States land base.

Procedure continued:

- Four federal agencies are responsible for the management of Wilderness areas. These are the U.S. Forest Service, which is part of the Department of Agriculture and the National Park Service, the Bureau of Land Management, and the U.S. Fish and Wildlife Service which are all part of the Department of Interior.
- It may seem strange to talk about "managing" something that is "wild," or "controlling" lands that are "natural." But management of Wilderness is important. We need laws to make sure people who use Wildernesses and the lands around them do not do things to harm the natural characteristics of Wilderness.
- In Wilderness areas, certain uses and human activities that are allowed on other public lands are restricted. For instance, while you would be able to use a power boat or snowmobile in a National Recreation Area, you would not be allowed to in most Wilderness areas because motorized vehicles are restricted. You cannot log timber in a designated Wilderness. If you wanted to camp with a large group of friends, you might have to do so outside the Wilderness boundaries because there are often limits on the number of people that can travel or gather as a group in Wilderness areas.
- You can think of Wilderness as being on the "pristine" or wild end of a use spectrum, with cities or towns at the other "paved" and civilized end. In the middle of the spectrum are rural or "pastoral" lands where there is more of a balanced use between people and nature. There are also federal land use designations that seem to be somewhere between the rural and the wilderness designation on the land use spectrum. They include:
    - wild and scenic rivers
    - national recreation areas
    - national conservation areas
    - national parks
    - wildlife refuges
- Of course, these separate land areas do not exist in a straight line, but overlap and compliment each other such as when a National Recreation Area exists within a National Forest. Together, they form a mosaic or jigsaw puzzle picture of land designation and use. You can imagine that because each of these different areas has different uses, purposes and regulations, the management of them, especially those that are next to or within each other, is a complicated task for the federal agencies.

Procedure continued:

2. Distribute "Land Management Agencies and Their Mandates" and "Management Challenges for Federal Agencies" handouts. Assign pairs of students to each of the four scenarios. Allow 20 minutes for working groups to complete the handout. Have each group select a speaker to share their management dilemma and recommendations they've come up with.

3. Upon completion of the assignment, ask each group to share their management challenge and solutions.

4. Summarize the activity by discussing the following questions:

    a. What are some problems that might arise when management agencies have situations in which Wilderness policies conflict with other management needs?

    b. What are some ways of solving such dilemmas?

    c. What are some advantages or disadvantages of having more than one federal agency manage Wilderness?

    d. Would you rather be in charge of a National Park Service, U.S. Forest Service, Bureau of Land Management, or U.S. Fish and Wildlife Service Wilderness? Why?

Evaluation / Follow-up / Extension:

- Assign students to write an essay summarizing each agency's role in Wilderness management, describing differences, similarities in agency's roles, and what the overall purpose is behind Wilderness management.
- Assign students to invite wilderness managers or field personnel from each agency into your classroom, as a panel, or as individual guest speakers to talk about their roles in Wilderness management. Students can prepare questions for speakers.

References:

Adapted from U.S. Forest Service, Investigating Your Environment, Wilderness Unit, "Wilderness Investigation-Legislation and Management."

STUDENT HANDOUT
Management Challenges for Federal Agencies

Activity 1: Legislation and Management

Each of the four agencies develops its own plans and policies to help manage the lands for which it is responsible, including Wilderness. Because each agency has several different purposes or uses for which their lands are managed, conflicts and challenges about how to best manage them in certain situations can occur.

Below are four hypothetical situations in which a management agency must make a complicated Wilderness management decision. Write down your ideas and thoughts about each situation and/ or what you would do.

1. To prevent the popular Sunset Wilderness Area from being "loved to death" by the approximately twenty thousand visitors who come there each year, the Bureau of Land Management (BLM) must decide whether or not to institute a permit system that will limit the size of groups and numbers of visitors. Local recreationists who have used the area for years are quite unhappy about the limitations and restrictions being put on their options for Wilderness experiences. A public meeting to discuss the permit system will soon be held.

2. Within the Falling Water National Park is a National Recreation Area where popular helicopter flights enable tourists to enjoy the breathtaking "bird's eye view" of a spectacular waterfall and gorge. The helicopters' flight plan from the heliport to the waterfall takes them along a Wilderness Area boundary. Backcountry visitors to the Wilderness area complain that noise from the helicopters disturbs the quiet and feeling of solitude that they came to the Wilderness to find. Park Service managers face a dilemma about whether to make management decisions based on National Recreation Area or Wilderness area priorities and regulations.

3. Scientists have been involved with a three year study of a rare and endangered plant that exists within the Green Meadows Wilderness Area of the Orion National Forest. A winter storm and flood has wiped out the existing trail into the study area. Many large logs and other thick and tangled debris lay across the only pathway along the river to where the rare plant study is to continue. The study is at a crucial stage and the scientists must get in within a week or all their previous investigations will be wasted. They want the U.S. Forest Service to change its policy of not allowing chainsaws in this Wilderness area so that the logs and debris can be moved more quickly.

4. At the Big Prairie Wilderness Wildlife Refuge, a serious infestation of mosquitoes known to be carrying a disease that could be deadly to the antelope herds is getting out of control. The only way to deal effectively with the mosquitoes is to either use an airplane to spray a pesticide over the infested areas or to dig deep ditches and install culverts to drain away the waters where the mosquitoes' eggs are laid. Both measures would contradict policies in the Wilderness management plan that was adopted for the area.

SOCIAL STUDIES
American Government; Geography

LESSON 2 • National Wilderness Preservation System Geographic Locations

Objectives:
Students will be able to study national, state, and local maps of Wilderness areas to understand where Wilderness areas are in the National Wilderness Preservation System (NWPS).

Duration: 1 to 2 class periods

Location: indoors or outdoors

Background:
The National Wilderness Preservation System (NWPS) was created in 1964 by an act of Congress. Sixty six versions of the Wilderness Act were introduced and debated for nine years before the bill was signed by President Lyndon B. Johnson on September 3, 1964. Originally, there were 54 areas included in the system, comprised of over nine million acres in 13 states. All of these areas were on national forest land, mostly in the western states. Since that time many areas and millions of acres have been added to the system.

Today we have 630 units in 44 states, for a total of almost 104 million acres. Federal Wildernesses are found in every state except Connecticut, Rhode Island, Delaware, Maryland, Kansas, and Iowa. A majority of the nation's Wilderness, approximately 60% of the system, is in Alaska. Almost 30 million acres, or one-third of the entire Wilderness system, is in the eleven western states. Thus, 95.3% of all protected Wilderness in the United States is in the eleven western states or Alaska. Only 4.7% of the nation's Wilderness lies east of the 100th meridian, and almost half of it can be found in just two areas, Everglades National Park in Florida and the Boundary Waters Canoe Area Wilderness in Minnesota.

The Northeast has the smallest amount of Wilderness. In eleven states from Maine to Maryland, where nearly one-quarter of the nation's population resides, there is a total of 192,686 acres of Wilderness. This represents two-tenths of one percent of the Wilderness system and less than two hundredths of one percent of the land area of those states.

The nation's largest contiguous Wilderness, 8.7 million acres, is in Wrangell-St. Elias National Park in Alaska. The largest Wilderness area in the lower 48 states is the Frank Church-River of No Return Wilderness in Idaho, which totals 2.3 million acres. The nation's smallest Wilderness, just three acres, can be found at Pelican Island off the coast of Florida.

Four federal agencies administer Wilderness, the U.S. Forest Service, National Park Service, U.S. Fish & Wildlife Service, and the Bureau of Land Management.

- The majority of Wilderness sources are administered by the U.S. Forest Service, 399 units comprising 34,676,493 acres.

Background continued:

- The National Park Service manages the most Wilderness acres, 44 units on 43,007,316 acres.
- The U.S. Fish & Wildlife Service manages 75 units on 20,685,372 acres.
- Bureau of Land Management was not included in the 1964 Wilderness Act and it wasn't until 1976 that the Federal Land Policy and Management Act gave authority to the BLM to inventory and recommend lands to be added to the wilderness system. They have 136 units comprising 5,227,063 acres.

The following activities will help inform students of the location of Wilderness areas in the United States and those areas nearest to them.

Activity 1: National Wilderness Preservation System

Materials:

- National Wilderness Preservation System (NWPS) map
- state or regional Wilderness map
- topographical map of a Wilderness area near your school

Procedure:

1. Briefly introduce the main features, color key, and symbols of the maps.
2. Ask students to locate Wilderness areas in their state or region. List them on the chalkboard by name and acreage. In what part of the state or region are most Wilderness areas located? Why? Locate the closest Wilderness to their local community. Have students locate the smallest and largest Wilderness areas in their state or region, and in the United States. Identify states where there are no Wilderness areas.
3. Distribute NWPS work sheet. Students may complete work sheets individually, or in teams.
4. Review and discuss work sheets. Engage students in discussion with these questions:
    - Why are the largest areas of Wilderness in the Western U.S.? Why is there so much Wilderness in Alaska?
    - What is the relationship between this pattern and the location of large population centers?
    - Why aren't there many Wilderness areas in the Midwest?
    - Why are most of these areas in mountains, and not in the plains? Why are there no Wilderness areas in Connecticut, Rhode Island, Delaware, Maryland, Kansas, and Iowa?

Evaluation / Follow-up / Extension

- Evaluate student work sheets.
- Encourage students to select a Wilderness in another region of the country to learn more about. Compare and contrast this Wilderness with those in your state or bioregion.
- Ask students to map their town, neighborhood, or area around their school. Get an aerial photo from the local planning or public works department. Color the parks and wild areas green. Answer these questions: Does your town have a lot of natural areas in parks and/or outside of parks? What are the advantages or disadvantages of having natural areas in your community?

Career Options:
Cartographer, rural or urban land planner, county commissioner

References:

- *Wilderness Awareness Training Module*, Arthur Carhart National Wilderness Training Center.
- fact sheet: "Status of the National Wilderness Preservation System," Natural Resource and Environmental Education Demonstration Project, U.S. Forest Service and Wilderness Institute, School of Forestry, University of Montana

SOCIAL STUDIES
Communication Arts: English; Speech/Debate

LESSON 3 • **Fact vs. Opinion**

Objectives:
Students will:
- distinguish between beliefs or opinions, values, attitudes, and facts.
- develop criteria for evaluating the quality, balance and fairness of information.
- evaluate the balance and fairness of information designed to represent points of view about Wilderness and land ethics.

Background:
People have many different points of view, particularly concerning issues like Wilderness. It is difficult at times to discern fact from opinion, objectivity from subjectivity, and accuracy from exaggeration. Sometimes people are knowingly selective in what information they present about a topic. Other times they do not realize that they are presenting only a narrow view of the topic.

Individuals in a community may hold differing beliefs or opinions, attitudes and values toward Wilderness and land ethics. There are many different reasons for the beliefs, values and attitudes people hold. Whatever the reasons or sources, the result may be strongly held differences of opinion related to the same issue in the same community. Sometimes the best solution to a local issue may seem obvious. More often, there are no clear "right" or "wrong" answers, yet emotions may be aroused and different "solutions" may have dramatically differing impacts on all involved, including Wilderness.

When people disagree, it's hard to figure out who is right. You may decide one person is right just because the person is your friend or relative. But this is not a very good reason to agree or disagree with someone. It is better if you try to understand why these people disagree. On what main points do they disagree? Read or listen to each person's argument carefully. Separate the facts and opinions that each person presents. Finally, decide which argument best matches what you think about this process. Examining an argument without emotion is part of what critical thinking is all about. This is not easy. Many things make it hard to understand and form opinions. People's values, ages and experiences all influence the way they think. This is why learning to read and think critically is an invaluable skill. In these activities students will acquire skills to analyze beliefs or opinions, facts, values and attitudes related to Wilderness and land ethics. For the purposes of this activity, the following definitions are given:

Belief or opinion: An information-based assumption. It may be right or wrong.
Example: The more Wilderness we have, the more predators there will be.

Value: A worth attached to some event, place, idea, etc.
Example: It is important to preserve Wilderness.

Background continued:

Attitude: Based on an implied belief system, an implied value system, with a predicted behavior.

Example:

We need to protect all remaining roadless lands in Montana as Wilderness.

This statement implied a belief that it is more important to leave roadless lands undeveloped than to open them up to multiple-use development.

Or:

We have enough land set aside as Wilderness, and we should open all remaining roadless lands in Montana to multiple-uses such as mining, road building, logging, and motorized recreation.

This statement implies a belief that natural resource development in roadless lands will provide economic benefits in the form of jobs and fewer restrictions on the types of recreation opportunities allowed.

Fact: A piece of information presented as having objective reality, something that has actual existence.

Example:

Four percent of the land mass of the United States is congressionally designated as Wilderness.

Interest Groups: Those individuals or groups who have an interest in an issue for personal, ecological, or economic reasons. They may or may not have much information, and may or may not have a strong opinion.

Wilderness: an area where the Earth and its community of life are not controlled by people, where natural forces prevail, and people may visit but not live permanently.

Land ethic: A value position originally developed by Aldo Leopold. This view depends upon an understanding of the science of ecology and the relationships among the parts of ecosystems. It also incorporates the belief that human beings are just one part of a larger Earth community of plants, animals, water, soils, collectively called "the land." Living things are viewed from the perspective of populations rather than individual things and about maintaining it in good health. Leopold believed that responsible actions would result if a person loved and respected the land.

SOCIAL STUDIES
Communication Arts: English; Speech/Debate

Activity 1: Opposing Viewpoints

Duration: 1 class period

Location: indoors

Materials:

- student/teacher handout: "Discussion Guidelines", page 113-114.
- student handout: "Opposing Wilderness Views", page 115-116.

Procedure:

1. Review definitions of beliefs or opinions, values, attitudes, and facts. Discuss the differences between an argument and a discussion. Refer to "Discussion Guidelines" student information pages. You may also want to establish clear rules for behavior during class.

2. Have students read and discuss the "Opposing Wilderness Views" handout. Ask students to think about these things:

- How do they agree?
- How do you think they disagree?
- Distinguish between the facts and the beliefs or opinions they state.
- What is your opinion?

Put the following continuum on the board:

More Wilderness   Enough Wilderness

Explain the differing viewpoints. Ask, "If you were to show your position on the Wilderness issue, where would you be?" Decide where you would be on this line and come to the board and place your name there. Ask students why they placed their names where they did. Discuss the differing viewpoints in the class and why students hold these views.

3. Give students four index cards each. Ask them to write down one sentence for each card. These sentences should consist of:

- one fact supporting the preservation of Wilderness
- one opinion supporting the preservation of Wilderness
- one fact in opposition
- one opinion in opposition

Procedure continued:

4. Bring exercise to closure by discussing both positions, and solicit other ideas or alternatives. Perhaps some of the remaining 6.2 acres of roadless lands can be set aside as Wilderness and some can be opened for multiple use management. Encourage students to see that there are no cut and dry decisions, that a solution to a controversy may be somewhere in the middle. No one will be completely satisfied with this compromise but each interest group will "give and take" of their positions. Review the definition of a **land ethic** and ask the students how they would apply a land ethic to the arguments for and against additional Wilderness.

Evaluation / Follow-up / Extension

- Evaluate students ability to respect differing viewpoints after presenting discussion guidelines and completing the activity. Grade class participation, ability to discern differences between facts and opinions, and completion of index card assignment.
- If there is a particular Wilderness near your school or community, it can be used to explore the different values that people place on the land. If you don't have a Wilderness or forest area, choose one in your state or region that is either already designated or is proposed for Wilderness designation. Divide students into groups and ask each group to research the value of that particular Wilderness or forest area in terms of the following perspectives:
    - timber value
    - watershed value (the amount of rainfall and drinking water produced by the area)
    - wildlife value (what animals live there, how much money is spent on hunting, management, etc.)
    - recreational values (What is the visitation, how much money is spent in the local community by recreationist)
    - forage value (amount of grazing of cattle or sheep that could be done)

  After this research is done, have the class discuss the impacts on these values when one or another use is made of the forested area. What trade-offs are involved? How does society determine which value is the highest?

Credit: CLEARING magazine, Wilderness Issue, Summer 1984.

Career Options:
Wilderness manager, natural resource professional, mediator, logger, miner, rancher, farmer, environmental activist

References:

- "Decision Making in a Nuclear Age," Chris Austill, ed.
- "What Do You Think?: Teaching Critical Thinking on Critical Issues," Susan Williams
- Project WILD, "Wildlife Issues: A Community Attitude Survey"

Activity 1: Opposing Viewpoints

STUDENT HANDOUT • **Discussion Guidelines**

The following chart, taken from "Decision Making in a Nuclear Age", Chris Austill, ed., could be given to students to set guidelines for the discussion:

Argument	**Discussion**
loud, angry, harsh tone	quiet, calm, even tone of voice
interrupting	letting the other person finish a point before you start to speak
changing the subject, using phony issues	sticking to each point until you've worked through it
insults, put-downs, sarcasm	treating the other person with respect
exaggeration (terrible, evil, everybody, always)	using careful, exact words
pushy or threatening body language	using calm face and hand motions
talking fast, rushing	taking time
thinking only of your next point instead of listening to the other person's idea	listening carefully and seriously considering the other's views
faking it if you don't know something, never admitting the other person has a good point	saying "I don't know" if you don't, agreeing with the other person's good points
the goal is to win	the goal is to find the truth
playing the victim to make the other person feel guilty	being clear and assertive about the situation
mind reading, telling the other person what he/she thinks or feels	asking the other person how he/she feels

Activity 1: Opposing Viewpoints

STUDENT HANDOUT • Discussion Guidelines

1. Try to ask open-ended questions with no right answers; accept opinions, analysis of facts and arguments.

2. Allow time for students to think before they answer, suggested time is 3 minutes.

3. Teacher should paraphrase, clarify, summarize points periodically, make it clear to the class where the discussion has been and can go.

4. Encourage student-student discussion by asking rebound questions, sending paraphrased answers back to students or to another student.

Use questions like:

- Is that what you mean? (to first student)
- What do you think? Do you care to respond? (to new student)
- Who agrees? Disagrees? Wants to rebut? (to class)
- Who can explain why he/she might think that way?

Rebound questions require good listening skills on the part of the students.

5. Stay with a student long enough for him/her to develop a point. Redirect statements back to the same student for clarification, defense, explanation, etc. Try to guide that student further along in his or her thinking, rather than jumping immediately to next student.

6. Ask forced-choice-decisions questions where students must take a position.

7. When necessary play devil's advocate in discussions to force students to support their own views. Be outrageous sometimes. That usually gets a response.

8. When students ask questions of the teacher, ask if other students want to respond before responding yourself.

9. Bring up value questions and/or moral choice questions in order to learn where your students stand on these. Explore these important issues with your students to find out where they are coming from, not to preach your point of view.

10. Accept all responses, correct them if facts are wrong, point out irrelevant or illogical information (or let other students do this).

Credit:
"What Do You Think?: Teaching Critical Thinking on Critical Issues" by Susan Williams.

Activity 1: Opposing Viewpoints

STUDENT HANDOUT • Opposing Wilderness Views

We Need More Wilderness

Just 4 percent of the land base of the United States is protected as congressionally designated Wilderness. That represents roughly 104 million acres. Currently there are 6.2 million acres of wild, roadless lands left in Montana that are up for grabs. The multiple-use people want to open it all to resource development and multiple-use management which will ruin pristine lands and watersheds. The result will be a loss of plant and wildlife species. The wild animals that live in Wilderness will all perish because their critical habitat will be destroyed forever!

It is important to save the last wild country from development. I've heard that one plant or animal species becomes extinct each day and that about one-third of the Earth's plant species are believed to be edible or medicinal. What if the plant that holds the cure for AIDS only grows in Wilderness? If we release the remaining wildlands to developers we may never have the chance to find the cure to AIDS. Let's not take a chance. We need to protect all remaining roadless lands as Wilderness to protect critical habitat for wildlife species and ensure genetic diversity of all living creatures.

Activity 1: Opposing Viewpoints

STUDENT HANDOUT • **Opposing Wilderness Views**

We Have Enough Wilderness

I like Wilderness. I use the Wilderness for hunting, fishing, trapping, hiking and camping. Every summer I take my family camping to the Wilderness where we look forward to relaxing, catching lots of fish and cooking them over the campfire. Even so, we have enough Wilderness. All our natural resources on forest lands are being "locked up." America has a proud history of wisely using our natural resources. I am a fifth-generation logger who makes a living harvesting trees. If the remaining acres of roadless lands are designated as Wilderness, I will become the next endangered species. I'm going to lose my job and I won't be able to feed my family. You know, you can't eat the scenery!

If these lands are released for multiple-use, there will be plenty of jobs for everybody. Everybody will benefit immediately—the loggers, the mill operators, the building industry, the businesses that provide services in the communities where we live, and the people who need homes. I just can't understand these preservationists who think Wilderness is more important than people trying to make a living.

Activity 2: We Can't Always Believe What We Read!

Background:
Everything we read, see, and hear is somewhat subjective. Everything is subject to an individual's personal filters and perspective. Objectivity is one goal of science. Even in the precise world of scientific measure, pure objectivity without some influence on the part of the observer may be beyond reach. So objectivity is a goal that is difficult, if not impossible, to achieve in a pure and technical sense.

If objectivity is so hard to achieve, what can we do to develop our own skills of objectivity? One way is to become more discerning about balance and fairness. When you hear a speaker presenting information on a controversial topic like Wilderness, is that person making an effort to describe the topic as a whole? Or is the speaker selectively describing only his or her view? Does the speaker acknowledge there are any other differing points of view? Is the speaker presenting accurate information or opinion as if it were factually based? Sometimes the distortion of information, or at least its lack of completeness, may be intentional. At other times the limitations are a reflection of emerging and conflicting perspectives about what is accurate information concerning the topic. These are some of the questions this activity is designed to address.

The purpose of this activity is for students to develop and use their own set of criteria for evaluating the quality, balance and fairness of information presentations.

Materials:
- sample brochures
- collections of sample print informational brochures and publications
- sample advertisements and articles from newspapers and magazines
- student handout: "Facts and Falsehoods", page 119.

Duration: two or three 45-minute periods

Location: indoors

Procedure:
1. Put together a file of sample informational brochures from various public or private agencies and organizations and articles from the local news media. Make sure some address Wilderness topics or issues. Examples are found in the Wilderness box, or collect your own set concerning local wildlands issues.
2. Assign students to collect articles from different media sources. They might read newspapers and magazines, or watch television newscasts on a regular basis for one or two weeks. Provide them with a "Facts and Falsehoods" student handout to evaluate the messages they see.

Procedure continued:

3. Divide the class into small groups. Give each group samples of informational brochures, handouts, or pamphlets that were collected. Ask students to analyze and evaluate these materials.

4. Ask each group to report on their findings. They can summarize their findings by giving the brochure an overall rating, using the five categories from "exceptionally accurate" to "exceptionally inaccurate." Ask them to support their evaluation with some evidence and response for their view.

5. As a large group, ask them to develop a "Checklist" they can use to evaluate informational materials, exhibits or presentations. What should be the characteristics of an informational presentation on quality? Of balance? Of fairness? Encourage further discussion on these questions: Is it possible to be forceful and effective in expressing one's view without becoming unfair or biased? Is it possible to separate one's own viewpoint from a publicly held neutral position? To what extent do government agencies, citizen's groups, businesses, interest groups, and individual citizens have a responsibility to acknowledge other points of view concerning their policies and practices? Add further ideas to the checklist. Post the final checklist in a visible place and provide each student with a copy of the final checklist for personal use.

Evaluation / Follow-up / Extension:

- Evaluate Facts and Falsehoods handout and group presentation.
- Visit a site where information is provided that is related to Wilderness or some other environmental issue or topic. Using your checklist, evaluate whether the programs, exhibits and printed materials appear to be balanced and fair.
- Students can contact organizations and groups from state and federal agencies involved with Wilderness; representatives of private environmental and conservation organizations; and, business and industry interests (like mining, ranching, farming, logging, tourism) in natural resource development for information. Information can be collected through written letters asking the organization's point of view (policy or position statement), the reasons the organization is taking that point of view, and a general statement of goals of the organization. Students can make predictions of the points of view and compare them with the responses they receive.
- Invite local members or representatives of the various groups to present their points of view in person.
- Think of five things you could do to enhance the public's understanding of Wilderness and land ethics in your own community without using propaganda.

Career Options:

Wilderness manager, natural resource professional, journalist, mediator, logger, miner, rancher, farmer, environmental activist

References:

- Project Aquatic WILD, "Facts and Falsehoods" and "Philosophical Differences"

Activity 2: We Can't Always Believe What We Read!

STUDENT HANDOUT • Facts and Falsehoods

1. Does the article or advertisement cite or list facts? What are they?
2. Does the item make a claim? Is the claim based on or supported by facts or by some sort of evidence? Describe the claims and the supporting facts and evidence.
3. Does the item or article base its claim or story on some part of science or technology? Is a scientific law or principle used to support the claims? If yes, what are they? Is a scientist or engineer cited as an authority? Who is he or she and how is his or her expertise established? What is the occupation of the writer?
4. Is there any indication that the writer of the article stands behind its accuracy or validity? Will the publishers or editors of the brochure, newspaper or magazine support their claims?
5. How could you go about checking or verifying the claims and facts in the article?
6. What is your overall assessment of the accuracy of the article or advertisement? Exceptionally accurate? Generally accurate? Somewhat accurate? Generally inaccurate? Exceptionally inaccurate?
7. Does the publication acknowledge different points of view or opinions about Wilderness? Where are they?
8. Have the information or facts been selected in order to support a particular view or perspective? Does the material try to persuade you in some way or are you invited to make up your own mind? What evidence can you find to support your viewpoint?

LESSON 4 • Wilderness Issues: Community Attitude Survey

Objectives:
Students will:

- assess the values held by various groups and individuals regarding Wilderness.
- distinguish between beliefs, values and attitudes.

Background:
This activity should be used as a follow-up to "Fact vs. Opinion" in this strand. If this lesson has been completed, students will have skills to conduct community interviews. The teacher should go over "Guidelines For Interviewing People" with students so interview questions are appropriate and those people consenting to interviews are treated with utmost respect and consideration. In this lesson students will develop a questionnaire and conduct a community survey.

Materials:

- writing materials to make questionnaires
- student handout: "Guidelines For Interviewing People", page 123.

Duration:
one week of class time, 45 minutes to one hour per day, plus time out of class to interview people in the community

Location: classroom and in the community

Activity: Wilderness Issues: Community Attitude Survey

Procedure:
1. Complete one or more of the previous lessons in this unit. Working in small groups, ask students to prepare a questionnaire that can be used to measure people's views about Wilderness. Questions should be constructed so that they can be analyzed according to people's beliefs, values and attitudes. Questions that can be answered with a brief "yes" or "no" will contribute to the students' success in getting people to take the time to cooperate in the survey. "Yes" or "No" questions are also easier quantified when the students are putting together the results. For example:

> "Have you ever visited a Wilderness?"
>
> > 47 Yes; 51 No; 67 undecided.
>
> "Do you use Wilderness at present for recreational purposes?"
>
> > "If yes, do you: fish, hunt? hike? other?

Procedure continued:

2. Students should sort and compile the questionnaire items generated by each group and come up with a final version of the questionnaire. The teacher should review the final draft before it is printed and used.

3. Each student takes the questionnaire and, after school and on weekends, interviews five individuals in the community. Students may work in pairs to conduct the interviews. Students record people's responses on the copy of the questionnaire they are carrying.

4. When interviews are completed, students may tally, analyze and discuss the results. Caution students that it is very hard to conduct what may be considered a scientifically valid community attitude survey. Such surveys require careful question construction, with the questions tested on a pilot basis and statistically analyzed in special ways to ensure they are measuring what they are supposed to measure. Who responds to the questionnaire is critically important before any generalizations can be made. For example, if the students find the first five people they see, or interview their parents and their next-door neighbors, they are likely getting what may be called a "biased sample" or too narrow of a sample base or profile.

5. Students may consider also asking open-ended questions to gather insight into aspects of their community's underlying belief systems. Those questions may prompt them to qualify their data interpretation.

Evaluation / Follow-up / Extension

- Choose an endangered plant or animal and describe one belief, one attitude, and one value that might be held related to it.
- Hold a class discussion on the question: Why is it important that people understand that their own attitudes about Wilderness come from their values and beliefs?
- Conclude this series of lessons with these discussion questions:

  1. Imagine a world without Wilderness:
     - What does it look like?
     - What happens to the animals?
     - How does it make you feel?
  2. Do you feel Wilderness is valuable even if you never get to use or visit it?
  3. With world population growing, do you feel we need to use the remaining Wilderness areas to provide material goods for the people or preserve the remaining wild lands to balance the impact of population pressures?
  4. Look at the definition of Wilderness in the Wilderness Act of 1964. What other areas besides forests could be considered for Wilderness?
  5. What arguments do the forest industry representatives use when opposing additional Wilderness designation? Can you see facts they have ignored? Can you see the use of emotion?

SOCIAL STUDIES
Communication Arts: English; Speech/Debate

Evaluation/ Follow-up/ Extension continued:

6. What arguments do the Wilderness advocates use when arguing for additional Wilderness designation? Do they ignore facts? Can you see the use of emotion?
7. Do you feel this is an emotional issue? Discuss some examples of how emotions are used to sway opinions.
8. Should the number of visitors to Wilderness areas be limited?
9. What uses or activities should be allowed in Wilderness areas? Why?
10. What impact will additional Wilderness have on the local economy? Why?
11. What do you feel is the most important reason for Wilderness?
12. Discuss the following beliefs many people hold regarding Wilderness areas:
    - Only a small minority of people use Wilderness areas.
    - Wilderness areas are only for elitist backpackers.
    - People with disabilities and all but the super-healthy can't visit Wilderness.
    - Wilderness represents a single use of the National Forests that "locks out" other uses.
    - Wilderness designation permits the spread of insects and disease and prevents effective control of wildfires.

Credit: *CLEARING Magazine, Wilderness Issue,* Summer 1984

Career Options:
Wilderness manager, natural resource professional, journalist, logger, miner, rancher, farmer, environmental activist

References:
Activity adapted from Project WILD, "Wildlife Issues: Community Attitude Survey"
CLEARING Magazine, Wilderness Issue, Summer 1984

Lesson: Wilderness Issues: Community Attitude Survey

STUDENT HANDOUT

Guidelines for Interviewing People

To some extent, everyone in a community is an expert on something. Perhaps your students will want to know what something in the community looked like 20 or 40 years ago. They may want to speak with some long-living residents. An interview can provide a powerful piece of oral history—or it can be an intrusion into the life and privacy of a person. If students are sent out to interview people, some guidelines are useful.

Students should have an introductory letter on school stationary explaining what they are doing, who they are, and asking for cooperation and assistance—with thanks in advance.

Interviews should be planned in advance, at least in terms of outlining major questions to be asked. Students should be taught to conduct a professional interview and to keep the interview focused on the purposes of the research. For example, students should listen and record their subject's responses. Rather than the students using the time of the interview to expound their own views on the topic, their task is to learn the subject's views. The subject should at all times be treated with dignity and respect. If any form of recording is desired, the people being interviewed should be asked in advance for their permission and should be told what will be done with the information. If you want to quote the person being interviewed by name, then the person should be given the opportunity to see the written proceedings of the interview, review any excerpts to be used, or review the recording before any class or public use of the information takes place. If any public opinion surveys or other forms of interviews in public places are planned, students should be supervised by adult helpers. People who might be concerned (shop keepers, mall managers, etc.) should be asked in advance and informed about the project and its purposes. If people do not want to be interviewed, thank them politely for their time and let them proceed with their business. As a general principle, it is recommended that any interviews to be conducted by students by arranged in advance by their teacher. An in-class trial run or practice session using role-playing techniques with students serving as constructive critics of their performances can be effective preparation for actually conducting interviews.

Credit: Aquatic Project WILD, "Living Research: Aquatic Heroes and Heroines"

SOCIAL STUDIES
Communication Arts: English; Speech Debate; Stewardship

LESSON 5 • **Wilderness Management Case Studies**

Objectives:
Students will:

- review the key points of the Wilderness Act of 1964.
- brainstorm solutions for Wilderness management issues.

Materials:

- Leave no Trace poster
- Soft Paths Video
- student handout: "Wilderness Key Points", page 126
- student handout: "Decision Making Considerations", page 127
- student handout: "Current Management Issue Scenarios", page 128-134
- chalkboard or butcher paper and markers

Duration: 2 to 4 class periods

Location: classroom

Background:
The Wilderness Act is the key to management decisions in Wilderness. It provides the foundation for federal agencies who manage Wilderness to develop policy and make decisions. In this lesson students will review the key points of the Wilderness Act, read and discuss current Wilderness management scenarios, and brainstorm potential solutions. To stimulate student interest put up the Leave no Trace poster. To set the tone show the Soft Paths video before beginning Activity 1.

Activity 1: Wilderness Management Scenarios

Procedure:
1. Make copies of the student handout "Wilderness Key Points" and distribute to the students. As a group, spend time reading through this handout and answering student questions. Write important parts of the Wilderness Act on the chalkboard or on butcher paper so students can refer to it during the activity.

2. Now students are ready to take on wilderness management scenarios. Make copies of the student handouts "Decision Making Considerations" and "Current Management Issue Scenarios."

3. Explain to the class that they will be divided into three groups, given a management scenario and assigned a role in the scenario. Students will review the decision making considerations and brainstorm a potential solution for the scenario. Examples of solutions might include education programs, regulations, signs, etc. After explaining the activity, distribute the handouts. Break the class into three groups, one group per scenario.

4. After each group has analyzed their case study, ask groups to share their scenario and solutions with the rest of the class. Encourage any additional solutions from the class that the small group may not have considered.

5. OPTIONAL: Have each person in the small groups assume a role in the scenario they were given and act out the scenario.

Evaluation / Follow-up / Extension:

- Evaluate group interaction and discussion.
- Have students write a short paper on what they think it would be like to be a land manager and what skills they think would be necessary to make good management decisions.
- Have students draw or write why they think Wilderness is important and what their responsibilities are for stewardship of public lands.

Career Options: Wilderness manager, mediator

References:

Wilderness Awareness Training Module, Arthur Carhart National Wilderness Training Center.

Activity: Wilderness Management Scenarios

STUDENT HANDOUT • **Wilderness Key Points**

1. Wilderness areas "shall be administered for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness."

2. "A wilderness…is hereby recognized as an area where the Earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain."

3. "An area of wilderness is…undeveloped Federal land retaining its primitive character and influence, without permanent improvements or human habitation."

4. Wilderness "generally appears to have been affected primarily by the force of nature, with the imprint of man's work substantially unnoticeable."

5. Wilderness "has outstanding opportunities for solitude or a primitive and unconfined type of recreation."

6. "Except as necessary to meet minimum requirements for the administration of the area…there shall be no temporary road, no use of motor vehicles, motorized equipment or motorized boats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area."

Activity: Wilderness Management Scenarios

STUDENT HANDOUT

Decision Making Considerations

Does your decision:

1. Consider the 1964 Wilderness Act?

2. Ensure that effects of human activities do not dominate natural conditions and ecological processes?

3. Allow Wilderness to retain spirituality, solitude and elements of surprise and discovery?

4. Consider more than economy, convenience, comfort or commercial value?

5. Ensure that future generations will be able to enjoy the benefits of an enduring resource of Wilderness?

6. What decisions do you recommend?

Activity: Wilderness Management Scenarios

STUDENT HANDOUT

Current Management Issue Scenarios

Solitude / Demand Scenario #1

Part of the definition of wilderness, according to the Wilderness Act, is that it "has outstanding opportunities for solitude." A story related in *Wilderness Management* (Hendee, Stankey, and Lucas, 1990) about Mt. Whitney illustrates how this solitude can be impaired in popular areas.

> "A man..., on August 4, 1949, climbed the peak with his father. Proudly they signed the summit register, the sixth and seventh individuals to have done so that year. On August 11, 1972, this same man climbed Mount Whitney with his son. Upon signing the register they noted with some shock that they were the 259th and 260th persons on record that day! Presumably there was less pride, and certainly less wilderness in the experience."

The Summit of Mt. Baker has been noted to have up to 200 climbers in one day. How would this affect your experience if you were climbing the mountain? How are all the people affecting the area? Do you see this as a problem? If so, what could be done to manage the situation? What could you personally do to alleviate the problem?

Possible viewpoints: Management Agency (Forest Service, Park Service, Bureau of Land Management, Fish and Wildlife Service), climbers, backpackers, climbing guide.

Role: Wilderness Manager Perspective

Your group represents the Wilderness managers. You need to decide on a plan to reduce the problems presented. Your job is to manage the Wilderness according to what the Wilderness Act states. You have been given some key points in the act that you will need to consider in your plan.

In 30 minutes you will be given time to briefly present your recommendations to the class. You should include answers for the following questions:

1. How will you provide people with an opportunity for solitude and a wilderness experience?
2. What can be done to protect the plants and wildlife from damage due to human activity?
3. Where will people go to the bathroom and what will be done with the human waste?
4. What will be done about litter?

Role: Climbing Guide Perspective Solitude/ Demand

Your group represents a mountain climbing guide service. You have been given a sheet with key points from the Wilderness Act you may use in your presentation. Your goal is to convince the Wilderness managers that you should be given a permit to take your clients climbing on Mt. Baker. Remember that your true objective is to make money, but you also care about the land. Solitude is not as important to you as the challenge and risk of climbing the mountain. You need to come up with a plan to minimize the impacts of humans on the area and on other people. How will your group help alleviate the problems instead of contributing to them?

In 30 minutes you will be given time to briefly present your ideas to the class. Some of the questions you should answer are:

1. How can you minimize the effect your groups have on other Wilderness users who are seeking solitude and quiet?
2. What can you do to prevent damage/disturbance to the plants and animals of the area?
3. Where will your clients go to the bathroom and what will happen to their human waste?
4. What will be done with your garbage and leftovers from meals?

Role: Day Hikers Perspective

Your group represents the day hikers. You like to escape city life for the day and get out into the peace and quiet of the Wilderness. You have always been able to go hiking up Mt. Baker on any day you wish without having to plan in advance. You do not, however, enjoy hiking five miles just to be surrounded by people. You have also noticed more litter, trampled ground, and toilet paper in the past few years.

In 30 minutes you will be given time to briefly present your ideas to the class. Be prepared to answer the following questions:

1. How should the Wilderness managers provide you with the opportunity to find the solitude you seek?
2. What should be done to protect the damage and disturbances to the plants and animals of the area?
3. Where can people go to the bathroom and what should be done with the human wastes?
4. How can litter in the area be reduced or prevented?

Activity: Wilderness Management Scenarios

STUDENT HANDOUT

Current Management Issue Scenarios

Wildlife / Recreation Scenario #2

Skylark Pass is a frequently used camping area. Unfortunately, the local black bears have discovered this. They're well known for their ability to sniff out hiker's food stores. Last year a panicked backpacker showed up at the Public Service Center. She had gone on a hike and left her camp set up at the Pass. She returned to find her tent wiggling through the meadow. A bear had smelled her snacks and crawled inside. Too frightened to stay, she hiked out without her car keys and hitch-hiked to the nearest ranger station for help. What should be done about the bear? Is it a safety hazard? What about the woman who left her food in the tent? Is it the responsibility of the Wilderness managers to keep bears away or are the users responsible for hanging their food to keep the bears away? What if hanging food does not work and the bear still gets the food?

Possible viewpoints: Wilderness manager, hikers, wildlife advocacy group.

Role: Wilderness Manager Perspective

Your group represents the Wilderness managers. Your goal is to manage the area in accordance with the Wilderness Act. You have been given a sheet with the key points from the Act that relate to this issue. Your job is to come up with ideas to resolve the situation.

In 30 minutes you will be given time to briefly present your ideas to the class. You should be able to answer the following questions:

1. Is the bear a safety hazard or is it part of the challenge and risk of a Wilderness experience?
2. Is the Wilderness manager responsible for keeping the bear away or are the visitors responsible for practicing camping techniques that will reduce risks from bears?
3. What will you do to solve this issue?

Role: Bear's Perspective

Your group is the bear. Your job is to let the Wilderness manager know your position on this issue. You have lived near Skylark Pass all your life and you know the area well enough to survive the harsh climate in this rugged land. You don't see a problem. If hikers leave their food, of course you are going to eat it. In 30 minutes you will be given time to convince the class that you should be allowed to stay. Use the key points from the Wilderness Act to support your case. You should be able to answer these questions:

1. Why should you be allowed to remain since you have become a "pest" and safety hazard to hikers?
2. What could be done to allow both you and the hikers to use the area in harmony?
3. How are the hikers adversely affecting your life?

Role: Backpackers

Your group represents the backpackers. You feel that the bear is a hazard to both your expensive equipment and your personal safety. What would you propose to the Wilderness managers as a solution to the problem? Use points from the Wilderness Act to support your argument. In 30 minutes you will be given time to briefly present your solution to the class. You should be able to answer the following questions:

1. What should be done about the conflicting interests of the bear and you?
2. Why should you be allowed to continue to use the area?
3. How could you and the bear exist in harmony?

Activity: Wilderness Management Scenarios

STUDENT HANDOUT

Current Management Issue Scenarios

Risk and Challenge versus Safety Scenario #3

The definition of Wilderness provides for "outstanding opportunities for…a primitive and unconfined type of recreation." By definition this involves a certain amount of challenge and risk. Unpredictable weather, tricky stream crossings, steep mountain climbing, and avalanches are a few of the possible hazards of Wilderness travel. Although some of these conditions can't be controlled, measures can be taken to make the environment safer. For example, bridges can be placed over hazardous creeks to provide a safe crossing. Views on what should be done in these situations vary widely. Some say there should be no maintained trails or structures in Wilderness while others would like to see all the bumps smoothed out so no one will trip.

In Big Water Wilderness a couple was out hiking and came to a creek crossing. The trail met the creek at a planned ford that was flat and very safe to cross, but was about thigh deep. Not wanting to get wet, the couple headed up stream to find a place to rock hop. They ended up attempting to cross above a 400 foot waterfall. After crossing, the man reached back to help the woman as she slipped on a boulder and fell to her death. What would you do about the crossing? Was her death part of the assumed risk taken when going into a Wilderness?

Possible viewpoints: Wilderness manager, senior hiking club, family hikers, adventure group.

Role: Wilderness Manager

Your group represents the Wilderness managers. Your job is to manage the Wilderness according to the Wilderness Act. You've been given a sheet with key points from the Act to consider in your decisions. You also need to consider factors such as public safety and liability.

In 30 minutes you will be given time to briefly present your ideas to the class. You should be able to answer the following questions:

1. How safe can we make the Wilderness?
2. Should the Wilderness be adapted to the visitors, or should the visitors adapt to the Wilderness?
3. What would you do about the crossing?
4. Do people have a right to expect some risk and challenge in Wilderness?

Activity: Wilderness Management Scenarios

STUDENT HANDOUT

Current Management Issue Scenarios

Role: Senior Hiking Club

You represent a hiking group for senior citizens. You are active and enjoy day hiking in the Wilderness. You're not as agile as you used to be, however, and can't climb rocks or ford streams safely anymore. You feel Wilderness should be available for your use and that safe trails, bridges, and signing are appropriate. Your job is to convince the Wilderness managers to put in bridges and signs so people can travel safely in the Wilderness.

You will be given 30 minutes to briefly present your ideas to the class. Use points from the student handouts "Wilderness Key Points" and "Decision Making Considerations" to support your arguments. You should be able to answer the following questions:

1. How safe can and should we make Wilderness?
2. Should the Wilderness be adapted to the visitors, or should the visitors adapt to Wilderness?
3. What would you do about the crossing?
4. Do people have a right to expect some risk and challenge in Wilderness? What about the less skilled users?

Activity: Wilderness Management Scenarios
STUDENT HANDOUT
Current Management Issue Scenarios

Role: Wilderness Adventure Group

Your group represents the Wilderness adventure group members. You like the challenge and risk of Wilderness travel; fast moving streams, cliffs, and freezing weather are all a part of the experience you seek. Of course, you are prepared for what you might face and have the experience to travel safely. You want to keep the "wild" in Wilderness. Your challenge is to convince the Wilderness managers to stop putting in signs and bridges on all the trails.

In 30 minutes you will be given time to briefly present your ideas to the class. Use points from the Wilderness act sheet to support your arguments. You should be able to answer the following questions:

1. How safe can we make the Wilderness?
2. Should the Wilderness be adapted to the visitors, or should the visitors adapt to the Wilderness?
3. What would you do about the crossing?
4. Do people have a right to expect some risk and challenge in Wilderness?

LESSON 6 • Celebrating Our Diversity Through Wilderness

Objectives:

Students will:

- explore the concept of wilderness and how it was established for the use and enjoyment of all cultures.
- define how students think about themselves, and how to consider and value the differences in other cultures.
- recall how different cultures perceive and value Wilderness.

Background:

We've come to a time in our history when we must refocus and redefine our ideals as they relate to a multi-cultural society. In a culturally diverse world, people of differing race, color, age, sex, national origin, and physical abilities contribute effectively at all levels of our society. No matter what culture someone is from, or where people are located geographically, their concerns are becoming consistently parallel. Although national statistics show that a large percentage of Wilderness visitors come from middle class America, many other socioeconomic and cultural groups have begun to take a strong interest in enjoying and assisting in the management of the National Wilderness Preservation System (NWPS).

"Multi-culturalism is making sense of our world and the complex realities that are sometimes puzzling, sometimes frightening" (H. Robinson). This lesson will enable students to take an educational journey combining self-understanding, understanding others, and how these basic principles relate to the perceptions, use and enjoyment of Wilderness by various cultures. The ecosystems of the NWPS are as diverse as the many cultures represented throughout the United States. Learning how to understand others, as well as ourselves, is an integral aspect of understanding why Wilderness has value for all.

Activity 1, "Visions of the Wild," is an interactive exercise emphasizing reasons why the NWPS was established and how Wilderness provides an array of values for a contemporary multi-cultural society. Activity 2, "All Things Are Connected", focuses on how various cultures value Wilderness by demonstrating how Native American cultures perceived wilderness traditionally and presently. This activity emphasizes the strong interconnectedness existing between American Indian tribes and the environment, stressing that many cultures rely on Wilderness for more than a recreational experience.

SOCIAL STUDIES
Historical/Cultural Perspectives

Activity 1: Visions of the Wild

Materials:
- video: "Visions of the Wild"
- chalkboard

Duration: 1 class period

Location: classroom

Procedure:
1. Begin by introducing the idea that most cultures throughout the world have some understanding or connection to the concept of wilderness. To many of the early European cultures, wilderness was a place of darkness and mystery. To indigenous cultures around the world, wilderness, or the environment, provided everything needed to develop and maintain a prosperous existence. Stress to the students that there are diverse perceptions of wilderness throughout various cultures.

2. Introduce the activity by asking students to respond to the question: What does the word "wilderness" mean to you? Write their responses on the chalkboard and summarize by emphasizing the fact that just as there are a variety of answers on the chalkboard, there are a variety of cultures who enjoy wilderness.

3. Introduce the 25-minute video, "Visions of the Wild," to portray why we have Wilderness and how the resource of wilderness has value for all cultures. Show the video.

4. After the video, ask the class to identify what the different values of Wilderness are as presented in the video. List them on the chalkboard. Then ask students to discuss how these values relate to various cultures, and write the culture next to the values as they are identified. Conclude the activity by emphasizing that many cultures value Wilderness in different, as well as similar ways, but the point remains that all cultures benefit from an enduring resource of Wilderness.

Activity 2: All Things are Connected

Materials:
- pencils
- video: "All Things Are Connected"
- teachers guide: *The Land is Sacred*

Duration: 1 class period

Location: classroom

Procedure:

1. Introduce this activity by reminding students that just as the NWPS hosts a variety of ecosystems, there are a variety of ways that different cultures perceive and experience Wilderness. Before showing the video "All Things Are Connected" explain to students that some Native American cultures view wilderness as their mother. The environment gives them all the essentials to survive as a people, and for this reason, the culture is very reverent towards the understanding and use of the Wilderness. Show the 15-minute video.

2. Select two interactive exercises from the teacher's guide "The Land is Sacred." Pick the two exercises that fit best with your local natural resource issues and make a strong effort to integrate the exercises into local Wilderness issues so students can relate to the subject from a personal standpoint.

3. Summarize the activity by stressing that the reason we have Wilderness is to protect the last remaining wildlands of this country for future generations. Why is Wilderness important to different cultures? Wilderness has more to offer us than just a recreational experience, as all cultures benefit from the clean air and water Wilderness provides. Conclude with the thought that just as Wilderness provides us with numerous benefits, all cultures contribute to our society. Encourage students to look at things through other people's eyes. Ask them to try to treat people with respect and honesty, just as they would choose to be treated. The challenge of living together in a multicultural world can be rewarding, and like Wilderness, multi-culturalism will provide VALUES FOR ALL!!

Evaluation / Follow-up / Extension

- Observe students interacting in everyday activities such as lunch and break periods. Note how they interact with each other. A progressive observation approach can be used to document the change in behavior, starting immediately after the lesson is presented, then periodically observing and documenting progress until revisiting the exercises presented in Activity 2, then after the second round of exercises are presented.
- Invite people from different cultures into the classroom to share their cultural perspectives on Wilderness and the environment.

Career Options:

anthropologist, archaeologist, linguist, ethnologist, teacher, natural resources professional

References:

- *Weaving the Tapestry of Diversity,* H. Robinson
- *Working Together,* Dr. George Simons

Lesson 7 • The Wildlands Proposal—Mapping Out Future Living Space

Objectives:
Student will:

- identify on a map: private land, urban centers, national forest land, designated wilderness, state land, national park lands, and other designated areas.
- explain what a proposed wilderness recovery network is in terms of its components and their designations and diagram a recovery network.
- state reasons why the Wildlands project may be difficult to implement.

Duration: 1 class period

Location: indoors

Background:
Several groups in the United States are currently endeavoring to map roadless areas in an effort to show how rapidly these areas are in some way being developed. There are others who are proposing that a new approach be taken in establishing protected tracts of land for wildlife. Not only do they believe that there is a need for protecting new areas of land, but there is also a need for wilderness recovery; the process of restoring impacted areas back to their natural condition.

A simplified explanation of their proposal: set aside and protect from human development large enough tracts of land to accomplish the following goals:

- represent all native ecosystem types
- maintain viable populations of all native species in natural patterns of abundance and distribution
- maintain ecological and evolutionary processes
- manage the system to be responsive to environmental change, maintaining evolutionary potential

The process for accomplishing these goals has developed into the concept of creating wilderness recovery networks. A wilderness recovery network is an interconnected system of strictly protected areas (core reserves), surrounded by lands used for human activities compatible with conservation that put bio-diversity first (buffer zones), and linked together in some way that provides for functional connection of populations and processes across the landscape. In actual practice, wilderness recovery networks would include many core reserves across a state with an intricate network of corridors connecting them like a web.

Credit: The Wildlands Project—special issue of *Wild Earth* 1992 Cenozoic Society

Activity 1: Mapping a Regional Wilderness Recovery Network for a Local Area

Materials:

- national forest/Wilderness map(s) for your area(s)
- large sheets of plastic acetate (can use recycled portions of an overhead projector roll) or photocopied areas of maps
- water soluble pens—highlighters for overhead projectors or dry erase markers
- overhead transparency of your state or regional roadless areas

Procedure:

1. Give the students a copy of the student handouts: "Mapping a Regional Wilderness Recovery Network for a local area. " Give them time to read the background material.

2. Go through the mapping process once with them, using a map taped up to the board with a piece of acetate covering the map.

Follow-up:

Show the overhead of your state or regional roadless areas on a chalk or dry erase board, have students propose a statewide wilderness recovery network. Draw in their proposals. Tack a state highway map up on the board (next to the overhead if possible). What may prevent the development of a state system? What would have to be done to develop a state system?

Evaluation / Extensions

- You may evaluate the students' performance on mapping a recovery network, on completing the exercise and handout questions. You may want to evaluate their understanding by having them write out a proposal as mentioned in the follow-up section. A paper and pencil test over the objectives is always an option.
- Have each student pick an animal with small territory requirements and set up a network for that one animal based on range and habitat requirements.
- Have students do further research on the Wildlands Project, have them report on current developments.

Career Options: wildlife biologist, range scientist, population research, cartographer, geographer

References: Noss,R.F. 1992. The Wildlands Project Land Conservation Strategy, Special Issue—Wild Earth, Cenozoic Society, Inc. Canton, New York.

Activity: Mapping a Regional Wilderness Recovery Network for a local area

STUDENT HANDOUT

Background:
Several groups in the United States are currently endeavoring to map roadless areas in an effort to show how rapidly these areas are in some way being developed. There are others who are proposing that a new approach be taken in establishing protected tracts of land for wildlife. Not only do they believe that there is a need for protecting new areas of land, but there is also a need for Wilderness recovery; the process of restoring impacted areas back to their natural condition.

A simplified explanation of their proposal: set aside and protect from human development large enough tracts of land to accomplish the following goals:

- represent all native ecosystem types.
- maintain viable populations of all native species in natural patterns of abundance and distribution.
- maintain ecological and evolutionary processes.
- manage the system to be responsive to environmental change, maintaining evolutionary potential.

The actual process for accomplishing these goals has developed into the concept of creating wilderness recovery networks. A wilderness recovery network is "an interconnected system of strictly protected areas (core reserves), surrounded by lands used for human activities compatible with conservation that put bio-diversity first (buffer zones), and linked together in some way that provides for functional connectivity of populations and processes across the landscape."

In actual practice, wilderness recovery networks would include many core reserves across a state with an intricate network of corridors connecting them like a web. See the illustration.

Procedure:

1. Select a map to work with and cover it with a piece of acetate plastic, tape the plastic on with tiny bits of tape, just enough to hold it in place.
2. Circle areas that have no human habitation - label these core reserves.
3. Try to connect as many of these reserves as possible with corridors that do not cross any human structures such as roads, dams, towns etc.

4. Draw a buffer zone around your core reserves and corridors - if the buffer hits any developed sites, determine if they are compatible with conservation practices. If they are not, you will have to reduce the size of your core reserve in order to provide some buffer space. You can use a wet towel to erase. Keep working until you have as large a network as possible drawn on your map.
5. Once your network is drawn, estimate the total number of acres that the core reserves contain. Use the map distance scale and this conversion factor: 1 square mile = 640 acres. (Note: a half mile squared = 1/4 or 160 acres). You may have to review how to measure, multiply and estimate total land mass with the students.
6. Answer the following questions, use another sheet of paper for your answers.

- Evaluate the habitat of the areas they have set aside. What kind of animals could live there?
- What kind of land makes up the largest percentage of your reserves (Wilderness, national forest, undeveloped private land, national parks)?
- What did you have to do to connect your core reserves? Will animals recognize the corridors you wish them to pass through? What will be the result of human encounters with the animals?
- Do you think your buffer zones are adequate?
- Will you allow any recreation in your buffer zone? Fishing, hunting, motorized vehicles...restrictions (some, none)? Why?
- Do you think more or less land should be preserved? Why?
- What do you think other groups of people might say about the wilderness recovery network proposal?

Lesson 8 • Wilderness: Human Uses, Past and Present

Objectives:
Students will:

- recognize that cultural resources are part of Wilderness and that these resources provide information about how the area was used by humans in the past.
- design ways to protect cultural resources in Wilderness.

Materials:

- copies of student handouts "Big River Wilderness Map " and "How Do People Use Wilderness?", pages 146-147.

Duration: 1 class period

Location: classroom

Background:
Native Americans inhabited the entire Western Hemisphere when Columbus landed in the West Indies in 1492 and their ancestors had lived here for at least the last 12,000 years. Many American Indians at the time of European contact were hunter-gatherers and they viewed wilderness and nature differently than did later arrivals to North America. For many native cultures there was no word or concept for wilderness. Instead, they considered themselves to be part of the natural world. Chief Standing Bear of the Ogalala Sioux recognized that for his people "there was no wilderness; since nature was not dangerous but hospitable; not forbidding but friendly" (Nash, 1982, p. xiii).

For centuries people have lived in what are now considered to be the most inaccessible parts of North America: the high Colorado Rockies, the Brooks Range of Alaska, the vast wilds of northern Montana, and the desert canyons of the Southwest. Their reasons for living in these places varied. Some native hunter-gatherers visited the high mountains annually to hunt for animals, gather wild plants, or perhaps, to search for stone to make tools. Migration was part of the yearly subsistence pattern and they left evidence of their passing: stone tools, tipi rings, the remains of ancient campfires. The Anasazi built permanent dwellings in the canyon walls of the Four Corners region and even farmed on the canyon bottoms. This desert "wilderness" was "home" to them.

Settlers came to these same places to mine for gold and silver, to trap wild animals for their furs, and to harvest trees for the construction of houses, railroads, ships, and factories. They too left evidence of their passing: cabins, mine shafts, garbage dumps, and metal tools. For them, wilderness was a place to find raw materials to build civilization (Nash, 1982).

Background continued:
Archaeological sites can tell the story of how people, both prehistoric Native Americans and later settlers, lived on the land. The remains of plants and animals found in a site can tell us what people ate thousands of years ago and where they might have traveled to get their food. Debris left in a mining camp might tell us what minerals historic settlers were extracting and how they lived while they were doing it.

Today many of these “wild “ places have been designated as Wilderness areas. Wilderness status provides protection for all aspects of each area including archaeological sites.

Vocabulary:

archaeological site: a place where human activity occurred and material remains were left

artifact: any object made or used by humans; store tools, cans bottles, catridge cases, etc.

cultural resources: a definite location of past human activity, occupation, or use; including archaeological sites, historic buildings, or American Indian sacred sites

hunter-gatherers: people who “make a living” by hunting wild animals and gathering wild plants

lithic scatter: chipped stone artifacts, tools and debitage from tool manufacture, scattered on the ground surface; here interpreted as short-term campsites

obsidian: black volcanic glass, commonly used by prehistoric people to make stone tools

pictograph: a design painted on a rock surface; usually by Native Americans or their ancestors

prehistoric: the time before written history; in North America, the time before European settlement

Activity 1: Wilderness: Human Uses, Past and Present

Setting the Stage:
Read the following to the students or use it as a guided imagery:

You are walking through a pristine wilderness. The beauty of the high mountains and tall trees surrounds you. Water cascades down steep, rocky channels bisecting the trail at every turn. A deer bounds away through the forests startled at your sudden appearance.

You leave the maintained wilderness trail and strike out across a field of boulders which form a ruffled skirt around the mountain's base. After hours of hopping from boulder to boulder you come upon a meadow and stop to rest. The meadow is lush, green and completely undisturbed. No one could have ever visited here before. But wait. As you set your pack down you notice a shiny black rock. On closer inspection you realize that it is a stone arrow point, crafted from obsidian, hundreds or even thousands of years ago. Some one has been here before. What are your thoughts?

SOCIAL STUDIES
American Government/History Connections

Procedure:
I. Share Background information and Vocabulary with students.

2. Divide students into groups of two or three. Distribute copies of the "Wilderness Map" and "How Do People Use Wilderness?" activity sheets to each group.

3. Using information from the "Wilderness Map," students complete the "How Do People Use Wilderness?" handout. Each group presents their results to the rest of the class.

Closure:
Archaeological sites are a part of many designated Wildernesses. Use the following questions for discussion.

1. What can archaeological sites teach about the history of our relationship to Wilderness? Can this information be useful today? In the future? Give reasons for your answers.

2. Is it important to preserve these sites? Why or why not? What can you do to protect archaeological sites in Wilderness?

3. Prehistoric and historic people often abandoned their garbage, tools, and shelters when they left. These items became the "artifacts" that archaeologists study to learn about the past. Is it acceptable for you to leave garbage when you visit the wilderness? Give reasons for your answer. How is your garbage the same as or different from prehistoric or historic artifacts?

Evaluation:
Students submit their activity sheets for evaluation.

Extension

- Read the following excerpt from "The Hopi View of the Wilderness" (Secakuku, 1993).

  "Hopis do not view cultural resources, such as ruins, as abandoned or as artifacts of the past. To a Hopi, these villages were left as is when the people were given a sign to move on. These homes, kivas, storehouses, and everything else that makes a community, were left exactly as they were because it is our belief the Hopi will someday return. Our people are still there. Today the Hopi designate these ruins as a symbol of their sovereign flag. Pot sherds are left in abundance, usually broken into small pieces with the trademarks showing. These are the footprints of the occupants. Hopis believe that ruins should remain untouched because when anything is taken it breaks down the value of holding the village in place.

  Hopi prophecy recognizes these cultural resources as part of today's living culture. They in deed should be protected for the future of our people. Most of the time, the way white men view protection, interpretation, and education seems not to be the Hopi way. For Hopis, protection is based purely upon the honor system, upon respect and trust. Sometimes Hopis feel that the things they believe—honor, respect, and trust—are not compatible with other societies but we continue to think it should be the Hopi way.

  The Hopi way of measuring the value of cultural resources and other so-called artifacts is not in terms of money. Rather it is their importance for life today and their future destiny. The future of the Hopi is a great burden to them because they believe they must live a life of

Extension continued:
spiritual meditation and humbleness in order to take this corrupt world, which will get worse, into the better world. Yes, they believe in the fifth world and their spiritual integrity must be strong to keep their ruined villages alive. Their houses, kivas, and shrines at the ruined village perimeters must be kept warm and active. They rely on their spiritual ancestors who passed this way and are still there to receive the messages."

As a class discuss the following:

- Summarize the Hopi's reasons for protecting archaeological sites.
- List other reasons for protecting archaeological sites.
- How are these similar to or different from the Hopi's reasons for protecting archaeological sites?
- Is one reason more valid than another? Why or why not?

- Two pieces of legislation, in addition to the Wilderness Act, affect the way cultural resources are managed in Wilderness. The **National Historic Preservation Act** of 1966 directs federal agencies to take responsibility in preserving historic properties on lands that they administer and to locate, inventory, and nominate properties that might qualify for the National Register of Historic Places. The **Archaeological Resources Protection Act** of 1979 provides for archaeological excavations as well as criminal penalties for violations. Ask students to research these laws and report how these policies might affect management decisions in Wilderness.

Career Options:

References:

- Knudson, Ruthann, Darby Stapp, Steven Hackenberger, William D. Lipe, and Mary P. Rossillon, 1982, A Cultural Resource Reconnaissance in the Middle Fork Salmon River Basin, Idaho, 1978. Cultural Resource Report No. 7. USDA Forest Service, Intermountain Region, Ogden, Utah.
- Nash, Roderick, 1982, Wilderness and the American Mind, Third Edition. Yale University Press, New Haven and London.
- Secakuku, Ferrell, 1993, "The Hopi View of the Wilderness." In Archaeology in the Wilderness, Federal Archaeology Report, Volume 6, No. 3. U.S. Department of the Interior, National Park Service, Washington, D.C.
- "Wilderness Ranger Training Module," Arthur Carhart National Wilderness Training Center.
- "Keep it Wild, A Citizen Guide to Wilderness Management," The Wilderness Society and U.S. Forest Service.

Human Uses Past and Present

STUDENT HANDOUT

How Do People Use Wilderness?

I. There are several sites (prehistoric, historic, and modern) located in the Big River Wilderness. How many of each type of site are there?

2. You will notice that sites are most frequently located along the river and streams. Why might this be the case?

3. Based on the information you have answer the following:
    a. How did prehistoric people use this area?

    b. How did historic settlers use this area?

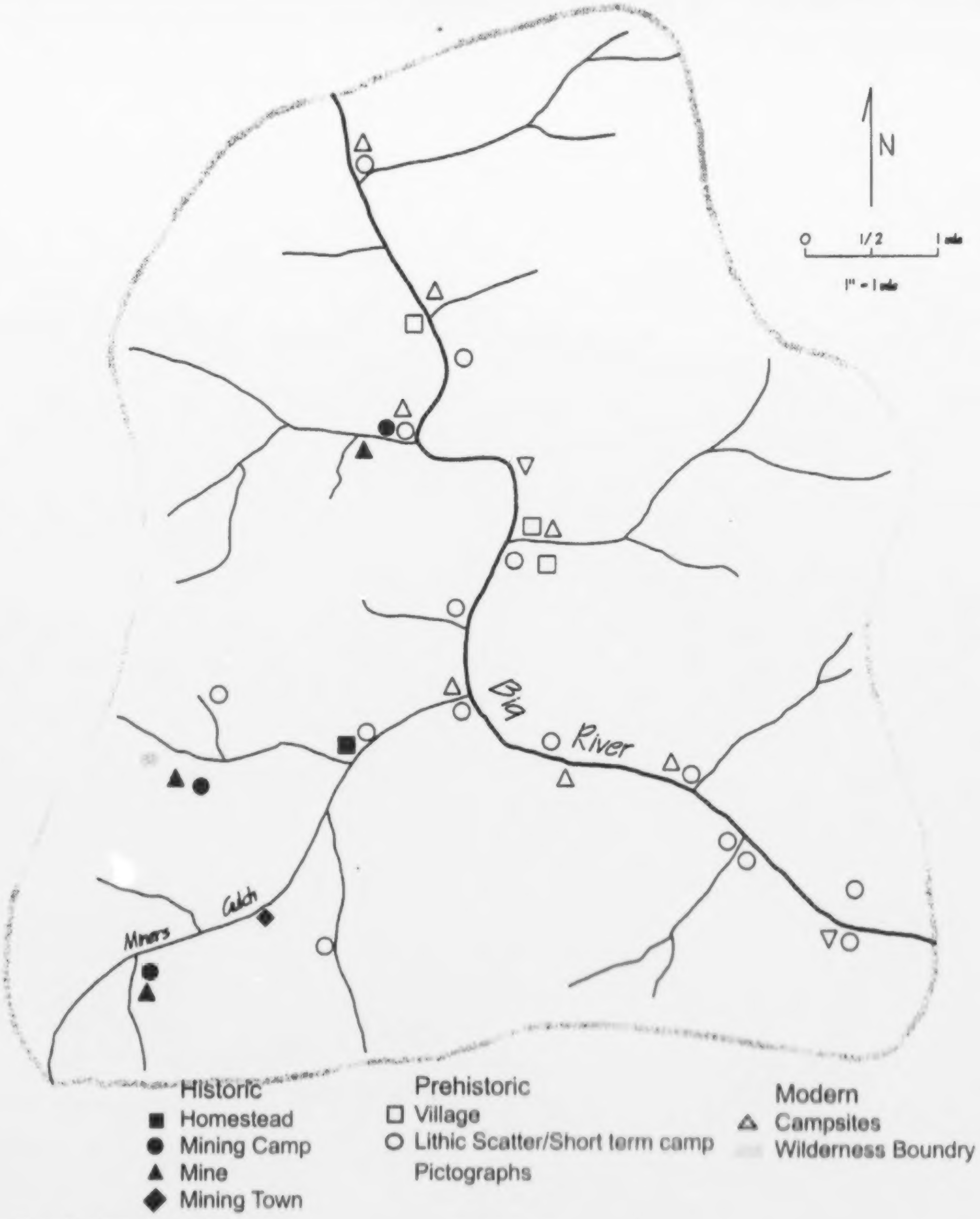
    c. How do modern visitors use this area?

4. How has the use of this Wilderness changed through time?

5. Describe how this Wilderness might be used 100 years from now.

Wilderness Uses Past and Present

STUDENT HANDOUT • **Big River Wilderness Map**



adapted from Knudsen, et al. 1982

How Do People Use Wilderness? Answer Key

1. Lithic scatters - 14
   Village- 1
   Pictographs - 2
   Homestead- 1
   Mines - 3
   Mining camps- 3
   Mining town - 1
   Modern campsites - 7

2. Most of the campsites are located near historic and prehistoric sites. People often choose the same places to camp for various reasons: level ground, fresh water, fuel source.

3. a. Prehistoric people lived in the area in temporary camps as well as permanent villages.
   b. Historic settlers came to mine for minerals. They camped and even built towns near the minerals they were extracting.
   c. Modern people visit the Wilderness, but do not stay long. They camp in many of the same places that prehistoric and historic residents did.

4. Prehistoric and historic people lived in the wilderness for extended periods of time and built permanent residences; modern people have not established permanent residences and probably camp only for short periods of time. Historic residents extracted minerals from the land and used it for farming.

5. Open question.

LESSON 9 • Recognizing Recreational Benefits of Wilderness

Objectives:
Students will:

- study, analyze, and compare recreation visitor days (RVD's) for Wilderness areas adjacent to their homes or nearest state, and other Wilderness areas across the United States.
- brainstorm potential solutions for recreation impacts in Wilderness.
- describe the environmental and economic impact of different kinds of Wilderness-related recreation.
- answer Wilderness-related recreation value questions.

Location: classroom

Background:
Wilderness offers many benefits to us: scientific, educational, scenic, and historical. The "Wilderness: An Overview" section offers excellent examples of these benefits, see page 5. It would be worthwhile for you and your students to review this information before launching into this lesson on Wilderness-related recreation use.

The Wilderness Act calls for "outstanding opportunities for solitude or a primitive and unconfined type of recreation" in Wilderness. Most Wilderness users enjoy camping, hiking, hunting, horsepacking, fishing, climbing, canoeing and nature study. Wilderness-oriented commercial services allow some people to enjoy wilderness values and recreational experiences. Outfitters guide services for horseback, hiking, mountain climbing, or river trips may be allowed under special use permits in Wilderness areas.

The challenge for Wilderness managers is to provide recreational opportunities while keeping wilderness an area "without permanent improvement or human habitation, …an area where people are visitors who do not remain." Visitors must accept wilderness largely on its own terms, without modern facilities provided for their comfort or convenience. Users must also accept certain risks, including possible dangers arising from weather conditions, physical features, and other natural phenomena inherent in various elements and conditions that make up a wilderness experience and primitive methods of travel.

To protect the Wilderness resource, restrictions may be placed on group size, campsite location, or length of stay in individual wilderness areas. Visitor education, trail design,

Background continued:
and other non-regulating measures are implemented before restrictions are imposed. Entry permits are required in some of the more heavily used Wilderness areas. Permits are necessary to preserve the area and to ensure that visitors are provided an opportunity for solitude. In the activities supporting the lesson students will analyze visitor use data to reflect patterns and trends in Wilderness, learn how natural processes are affected by recreation use, develop economic costs of recreation activities, and discuss recreation benefits and Wilderness-related management implications.

Activity 1: Wilderness Carrying Capacity

Materials:
- chalkboard
- student handout: "Visitation Data", page 152.
- National Wilderness Preservation Map

Duration: 1 class period

Procedure:
1. After reading the background section, introduce the activity with the following information. In order to preserve naturalness and solitude, it is essential to manage the Wilderness resource. Creative management of people in Wilderness is a growing need in the United States as demand and use grows. Controlling the impacts of human use is necessary to preserve the elements of solitude and naturalness required by the Wilderness Act.

2. Discuss potential problems and conflicts associated with recreation:
    - overuse of popular areas resulting in environmental degradation and lack of solitude
    - water pollution from human and animal waste (horses, mules, cows, etc.)
    - aesthetic degradation, for example, 3-foot-high stumps alongside a lakeshore.
    - historical snowmobile and ORV use in some Wilderness areas
    - wildlife/human conflicts
    - soil compaction and trampling of native vegetation
    - "taming" the Wilderness—too many or too easy trails, permanent fixtures such as bridges, signs and toilets.

Procedure continued:

3. Now that more and more people are discovering and experiencing Wilderness and wildlands, overcrowding and overuse has become a problem. Transfer the following visitation data on the chalkboard. Ask students to read and consider this student hand out, "Wilderness Visitation". It is obvious that Wilderness recreational use is increasing rapidly, creating problems related to the maintenance and protection of Wilderness areas for their established purposes. Excessive recreational use affects wildlife, vegetation, and watersheds. People seeking to spend time in some Wilderness areas are finding urban problems in the form of heavy traffic, cars vandalized at trailheads, water pollution, litter, and overcrowding.

4. Hold a discussion on the following questions. You may ask individuals or small groups to be prepared to state a position, which the class could then discuss.

- Under what circumstances, if any, might citizens be restricted from entering and using a public Wilderness?
- What circumstances may have caused the tremendous increase in Wilderness recreation activity?
- Should Wildernesses be managed to accommodate more visitors? If so, how? What problems might be solved and what problems might be created by your proposal?
- What are the purposes of Wilderness areas? Has the intent changed? Why? Does it appear that any other changes are necessary or appropriate? Describe your reasoning.
- Should more Wilderness areas be established? If so, where? What impact might the increase of Wilderness have on the use of resources for other purposes? What possible trade-offs are involved? Would you be willing to accept those trade-offs? State your reasons. Examining the National Wilderness Preservation Map might help students answer this question.
- If our population and cities continue to grow, would there be a still greater demand on Wilderness areas for recreation?
- If it were possible to create more parks in urban areas, how might this affect the demand on Wilderness areas?
- What other possible means are there for maintaining and using Wilderness?

Credit: "Teaching For Wilderness," Wendy Scherrer, North Cascades Institute

Activity 1: Wilderness Carrying Capacity
STUDENT HANDOUT
Wildernesses Visitation

Recreation areas, including Wildernesses, are under increasing pressure as more and more people are using public lands, as indicated by the following data.

Number of Visitors to Wilderness	1975	1980	1985	1990	1995
Bob Marshall Wilderness, MT	15,700	23,790	20,270	18,110	19,960
Boundary Waters Canoe Area Wilderness, MN	76,400	78,800	81,200	106,000	106,000
Superstition Wilderness, AZ	82,600	84,600	98,700	102,000	108,000
MT Jefferson Wilderness, OR	24,853	29,238	30,300	26,976	30,100
Grand Canyon National Park	73,160	77,139	75,067	83,178	90,178
Yosemite National Park	78,954	64,441	52,100	51,923	52,699
Denali National Park	17,399	30,334	27,182	36,000	37,164
Glacier National Park	24,800	22,600	14,800	19,500	28,923

Activity 2: Plan a Trip

Materials:

- Students will need to gather information on costs of Wilderness-related recreation options.

Duration: 1 class period, possible homework

Procedure:

1. Ask your students to generate a list of the different ways in which they might use a Wilderness for outdoor recreation. For example, backpacking, horsepacking, fishing, hunting, climbing, canoeing, and nature study.

2. Divide the class into small groups. Ask each group to plan a visit for the same length of time to the same Wilderness, choosing one of the uses listed above.

3. Ask each group to find out what they would need for the visit and what costs would be involved. For example, identify economic costs related to such things as price of equipment, special training, travel costs to reach destination, hiring a commercial outfitter, hunting and fishing licenses, permits, and maps. Identify possible environmental costs such as loss of forage for wildlife, soil compaction and erosion, and stress to wildlife populations.

4. After all the groups have gathered and organized this information, ask groups to compare the costs of the trips by discussing these questions:

- Which recreation activity costs the most and which the least?
- Which recreational use requires the greatest and which the smallest expenditure of energy? Be sure to take into account energy used in manufacturing and maintaining equipment.
- How does the economic costs of these modes of use relate to their environmental cost or impact?
- Does the dollar amount you spent on the trip or experience represent its full economic cost? For example, who pays for transportation from home to the Wilderness trailhead and return? How much will it cost to hire an outfitter who will furnish appropriate equipment, meals and guiding services?

5. Follow this discussion by an analysis of the various potential benefits related to each of these recreational uses of and practices within a Wilderness. Weigh the costs and the benefits related to each and discuss why these are important considerations. Take a trip that seems to combine the greatest benefits with the fewest negative costs.

6. Branch into a discussion of qualitative values and the potential problems associated with having to come up with monetary values.

Credit: Adapted from *Project Learning Tree Guide 7-12*, "Plan a Trip."

SOCIAL STUDIES
American Government/History Connections

Activity 3: Wilderness Value Questions to Ponder...

Materials:

- copies of Wilderness Value Questions from the procedure section, and "Laws Affecting Wilderness Management," "Wilderness: An Overview" section, pages 17-20.

Duration: 1 class period

Procedure:

1. Present the following questions on the chalk board, as a hand out, or on an overhead transparency.

- Do you feel we should be rescuing a person with a broken leg (not in life threatening situation) in Wilderness with a helicopter? Are there other transportation alternatives?
- If available free to you, would you take a cellular phone into Wilderness with the thought that it would only be used to help in an emergency situation?
- Do you feel it is appropriate to leave some established rock bolt routes for climbing in Wilderness?
- Does the value of having the number of users controlled by a permit system outweigh the value of unregulated use and freedom in Wilderness? Do you believe permit systems should be used in Wilderness?
- Should people be allowed to collect animal antlers, historical artifacts, or natural objects in Wilderness?
- Should recreation opportunities be the dominant value of Wilderness?

Activity 4: Observing Ecological Processes on the Landscape

Materials:

- video: "Soft Paths"

Duration: 1 class period

Location: classroom

Procedure:

1. Show video. Discuss different types of potential impacts to the environment, people, and animals. Define and list them. Discuss how these principles support ecological processes in Wilderness.

Procedure continued:

- Do you feel it is OK to have trail signs in wilderness? Do you feel it is OK to put mileage on signs in the Wilderness?
- Is it OK to bury decomposable garbage in Wilderness?
- If you have a well-behaved dog, would you feel it is appropriate to take it with you in Wilderness, or should the dog remain at home?
- In your own mind, is it appropriate for outfitters to have business operations dependent on Wilderness?

2. Introduce students to the activity by explaining they will use the knowledge gained from the previous activities to ponder questions Wilderness managers struggle to answer. Stress to the students there are no easy answers. First and foremost, Wilderness managers must determine whether the answer can be found in the Wilderness Act. Further consultation and consideration must be made by studying other natural resource policies affecting Wilderness.

3. Have copies of the Wilderness Act and other Wilderness-related policies available for students to reference. The Wilderness Act and "Laws Affecting Wilderness Management" can be found in the "Wilderness: An Overview" section of the curriculum, pages 46 and 17, respectively.

4. Divide the class into small groups. Assign 1-2 Wilderness Value Questions to each group. They will then discuss their value questions, consult Wilderness-related policy, and come up with a response they will share with their classmates.

Evaluation / Follow-up / Extension

- Evaluate assignments from each activity conducted.
- Assign an essay or journal entry to describe recreation benefits and values of Wilderness.
- Invite a wilderness manager to speak to your students about Wilderness management challenges.
- Conduct a life-style survey and relate the connection between "standard of living" to "quality of life" which includes the desire for wild places.
- For further investigation, refer to other Social Studies lessons, Lesson 1: Who Manages Wilderness, page 102, Lesson 2: National Wilderness Preservation System, page 12, and the Wilderness Act and Wilderness Management Case Studies, page 46.

Career Options:

Wilderness manager, recreation planner for county, city, state, or federal program, social scientist, research scientist, commercial outfitter or guide, outdoor recreation leader

References:

- *Wilderness Awareness Training Module*, Arthur Carhart National Wilderness Training Center.
- *Wilderness Management*, John C. Hendee, George H. Stankey, and Bob C. Lucas.
- *Teaching for Wilderness*, Wendy Scherrer, North Cascades Institute.
- *Project Learning Tree Activity Guide 7-12.*

LESSON 10 • **Wilderness Careers**

Objectives:
Students will:
- define and explore Wilderness-related career options.
- interview one Wilderness-related career professional.
- select, research, and write about a Wilderness career.

Background:
Now that **Ecosystem Management (EM)** is the desired goal of many land management agencies, wilderness managers are expanding their horizons to better understand, that what happens outside Wilderness affects what happens inside Wilderness and vice versa. EM takes into account considerations for water, airsheds, wildlife, plant communities, and the role of people. Wilderness is the heartbeat or anchor point from which ecosystems extend outward. When we examine Wilderness and the role it plays in the larger scheme of Ecosystem management, **career options** are greatly enhanced and expanded. Before land managers began to incorporate EM concepts, on-the-ground career options in Wilderness were limited to positions of Wilderness rangers, stock support packers, outfitters or guides, fire fighters, and trail crews. Now forest planning incorporates the talents of many professionals who have a vested interest in Wilderness and managing healthy ecosystems. For example, a **fisheries biologist** might work with Wilderness managers to maintain healthy native fish populations in watersheds originating in Wilderness subjected to threats from invading, nonnative species. A **landscape architect** might be consulted to help design a new trailhead access into the Wilderness or design the best methods to restore impacted areas. A **Wilderness ranger** might work with local area school teachers to educate children about land stewardship on all private and public lands. A **range ecologist** might inventory noxious weed infestation and recommend ways to eradicate the nonnative species.

This lesson gives students exposure to a vast array of Wilderness-related career opportunities. They will review specific job descriptions to get an idea of what is expected and determine whether they can see themselves in that position. They will then select a career option that interests them and conduct further research into that option. Students will utilize interviewing and writing skills to share their knowledge of career options.

Activity 1: Wilderness Career Opportunities

Duration: 1 class period to 1 week

Location: classroom

Materials:

- student handout: "Wilderness Career Opportunities Master List"
- student handout: "What is the Job of Wilderness Manager"
- student handout: "What is the Job of a Wilderness Ranger"
- student handout: "A Day in the Life of a Wilderness Ranger"

Procedure:

1. Introduce the lesson with the following simple exercise. Read the clues and then ask students to guess what career you are providing clues for.

    - I love the color green.
    - I usually travel alone but sometimes I enjoy being with others of my kind.
    - Sometimes campers fear me, though most campers think I'm interesting.
    - You can find me in forests, rivers, deserts, and swamps across the country.
    - I am an omnivore and eat lots of dried foods during the summer and fall.
    - My friends think I'm wild and call me the Lone Ranger.
    - Who am I?

Correct Response: Wilderness Ranger

2. Review background information to begin discussion of Wilderness-related career options. Ask students to brainstorm career options. Have students read the four student handout pages 160-163.

3. Ask students to select one career option from both lists generated above. The students will conduct further research on their career choice. Students will contact the nearest agency office of the Forest Service, Park Service, Bureau of Land Management, or National Fish & Wildlife Service. Once they locate personnel who hold this position, the student will make arrangements to interview the professional who represents their career choice. Students will design interview questions and write a summary paper. With information gained in the interview, students will complete a writing assignment. The assignment should include a description of the job, how it relates to Wilderness, exciting anecdotes or stories from on-the-job experiences, why the job is important to Wilderness, and professional and personal advice when pursuing such a career. The assignment should also include the student's impressions of the career they chose to write about.

Activity 2: Early Day Rangers

Duration: 1 to 2 class periods, some homework

Location: classroom

Materials:
- video: "The Man Who Planted Trees"
- book: *Adventures of a Pioneer Forest Ranger*

Procedure:
1. Show the video: "The Man Who Planted Trees," (30 minutes) as an inspiration for commitment to land stewardship.
2. Select stories from *Adventures of a Pioneer Forest Ranger* as an individual reading assignment.
3. Ask students individually or in small groups to generate discussion questions and conduct discussion of the reading.
4. Assign a creative writing exercise: Imagine yourself working a job in a remote wilderness one-hundred years ago. Describe your life.

Evaluation / Follow-up / Extension:
- Develop simple job descriptions for Wilderness-related careers, one per card. Use "Wilderness Career Opportunities Master List" as a reference, page 159. Place the job description on one side, the job title on the other side. Students can use the cards to play a game where the description is read by one student while the other students guess what job this could be.
- Contact people who have retired from Wilderness related careers. Invite them to talk to the class on what it was like to work in Wilderness during their careers. Suggestions might be field rangers, packers, outfitters, or trail crew workers.
- Work with school career counselors to identify Wilderness-related summer work opportunities through state conservation corps, federal youth conservation corps, and private organizations like the Student Conservation Service.

Career Options: see Master List that accompanies this lesson.

References: Wilderness Career Opportunities Fact Sheet, U.S. Forest Service and the Wilderness Institute, School of Forestry, University of Montana.

Activity 1: Wilderness Career Opportunities

STUDENT HANDOUT

Wilderness Career Opportunities Master List

Field Personnel
- Wilderness Ranger
- Trail Crew worker
- Outfitter or Guide
- Fire Fighter
- Restorationist
- Stock Packer
- Lookout
- Park Ranger

Professional
- Archaeologist
- Fish Biologist
- Wildlife Biologist
- Botanist
- Hydrologist
- Landscape Architect
- Ecologist
- Game Warden
- Air Quality Specialist
- Entomologist
- Researcher
- Teacher
- Interpreter/Naturalist
- Environmental Educator
- Resource Manager
- Outdoor Recreation Planner

Administrative
- Recreation Forester
- Resource Forester
- District Ranger/Unit Manger
- Recreation Staff Office
- Forest Supervisor
- Regional Wilderness Specialist
- Park Superintendent
- Refuge Manager

Other
- Environmental Activist
- Outdoor writer
- Retail Sales
- Policy Maker
- Wilderness Therapy Staff
- Outdoor/Expedition Leader

Activity 1: Wilderness Career Opportunities

STUDENT HANDOUT

What is the Job ofWilderness Managers?

In recognizing the wide range of Wilderness qualities from east to west, managers adapt management strategies to meet the unique management challenges each area presents. With that in mind, the following list describes the complex and diverse roles of wilderness managers.

- Monitor, protect, and restore biological diversity and integrity.
- Analyze external threats to wilderness i.e. water, air, and noise pollution.
- Initiate public involvement in wilderness management issues through implementation of the Limits of Acceptable (LAC) process or Visitor Experience and Resource Protection Plan and Program (VERP) management framework.
- Implement the management process to analyze and evaluate physical and social conditions in wilderness.
- Design and apply management strategies to maintain or restore physical and social conditions in wilderness.
- Develop Forest/Park policy, wilderness implementation schedules, and long range budgets.
- Communicate wilderness philosophy to internal and external publics in order to improve conditions in wilderness.
- Educate wilderness users to reduce physical and social impacts in wilderness.
- Initiate, expand, and promote partnerships and volunteer programs.
- Coordinate with other departments within the agency on projects and issues pertinent to wilderness.
- Cooperate and coordinate with other agencies that have wilderness management responsibilities.
- Administer outfitter and guide permits and coordinate with professional wilderness organizations.
- Administer mining, grazing, and water development rights/permits and monitor impacts.
- Maintain trails.
- Implement law enforcement strategies where necessary.
- Supervise field-going Wilderness rangers.

Activity 1: Wilderness Career Opportunities

STUDENT HANDOUT

What is the Job of a Wilderness Ranger?

A Wilderness Ranger:

- Initiates public contacts in the field to enhance the user's wilderness experience and protect the wilderness resource through dispersal of information and/or enforcement of Federal Regulations.
- Develops and conducts wilderness education programs.
- Records visitor use levels, type and patterns.
- Posts special regulations and issues notices of violation. Conducts investigations, collects evidence and prepares case reports on violations.
- Inspects outfitter operational camps and reports noncompliance to Wilderness manager. Recognizes exemplar outfitter operations and works cooperatively with them.
- Develops and implements wilderness or trail restoration and maintenance projects.
- Clears trails using primitive tools such as crosscut saws, and/or axes.
- Assists in preparation and execution of wilderness management plans.
- Cleans and naturalizes wilderness campsites.

Physical Demands

The work requires walking and climbing in steep, uneven terrain, exposure to adverse weather and insects, performing physical labor, bending, lifting and carrying up to 50 pounds or more. Wilderness rangers normally work alone. Camping out in wilderness settings over extended periods in a variety of weather conditions poses demands. A Wilderness ranger is required to operate a vehicle (4-wheel drive pickup) and he/she drives over all types of roads.

Work Environment

Work is performed where there is exposure to extremes of weather and topography. Work area varies from established administrative areas to Wilderness areas. Work requires the use of safety equipment such as tools, gloves, goggles, and hard hat. It also requires working and living under primitive conditions.

Activity 1: Wilderness Career Opportunities
STUDENT HANDOUT
A Day In The Life Of A Wilderness Ranger

ONE DAY WITH A WILDERNESS RANGER

At the crack of dawn, Carol wakes up without an alarm clock. Although working without stock on this trip, she is still running on mule time. A cup of coffee and the cold mountain air complement the beauty of sunrise. Carol is a Wilderness Ranger in the Shining River Wilderness.

After a quick breakfast cooked over a backpack stove, Carol breaks camp, packs up and heads for the trail. The day's work begins with hope for a radio check in. Often the hand held radio does not work in the backcountry because of the remoteness or severe weather.

Today, however, the radio works fine. Carol calls in that she hopes to be at camp ten miles down the trail by evening. Between her and that evening camp are many downed trees to saw and litter to pick up.

Carol has hardly walked a quarter mile when she reaches down to pick up a gum wrapper. Carol's trained eyes rarely miss even the smallest pieces of trash. She pockets the wrapper which she will later add to her ever growing trash bag. Her backpack never seems to get lighter no matter how much food she eats.

About two miles and four sawed logs down the trail, Carol comes across the first people she has seen since yesterday morning. A small group of backpackers is just finishing breakfast. They seem to have a clean camp although it is a little close to the trail for her liking. Carol explains how a campsite further away from the trail will provide greater privacy for all people in the area. After a quick greeting and answers to questions about trail conditions and fishing, Carol is on her way again.

While crossing a small stream, Carol slips on a wet rock and finds herself sitting waist deep in some very cold water. She is happy to not be hurt and even happier no one was around to see her clumsy splashing. She quickly changes into a dry uniform.

Next stop lunch. Carol planned on stopping to eat near a campsite which needs cleaning. Her boss had also asked that Carol fill out an inventory form for the campsite. She finds the campsite without any problem. At the campsite are an outfitter, his guests and horses, who have also stopped for lunch. A few of the guests are obviously on their first Wilderness trip. They are surprised to see a woman walking alone in the middle of the Wilderness.

Carol weathers with a smile some good natured kidding about a single woman running

ONE DAY WITH A WILDERNESS RANGER continued:

around in the woods. She explains the campsite inventory she is working on. The outfitter and his guests are impressed by the inventory process and job of a Wilderness ranger. They are also impressed with her outdoor skills. Carol leaves after lunch feeling that these people appreciate the work she does and respect her because it's not an easy job.

At the top of the ridge, Carol is greeted by the sight of a nasty thunderstorm coming her way. She had hoped to take a short break after climbing up twenty-six switchbacks. But now it looks like a race with the thunderstorm to her evening camp. Carol loses.

Carol puts up her tent ten hours after starting out in the morning. Her rain gear has kept her reasonably dry. The thunder and lightning were nothing new, and the prospect of a cozy tent and sleeping bag makes the weather seem a little less severe. The last obstacle between Carol and her camp is a fresh, steaming pile of bear scat. Although bears have never bothered her, the fresh tracks and scat cause her to stop and think. She will make sure to set up her camp a safe distance from the bear tracks and scat and hang her food in a bag 10 feet up a tree. Even so, Carol likes the fact that bears still roam wild in the Shining River Wilderness.

Bears are just another part of the wild country which Carol is very fond of. For a special few, being a Wilderness ranger is the best job in the world. The pay isn't great. The hours are long. The working conditions often are uncomfortable and dangerous. But for Carol all of the drawbacks are easily outweighed by the benefits.

For now Carol looks forward to a hearty supper, a few pages of writing in her daily journal and a comfortable night's sleep. The trail continues on from camp and tomorrow promises to be another fine day.

Credit: U.S. Forest Service and The Wilderness Institute, School of Forestry, University of Montana, Fact Sheet Number 12, "A Day in The Life of A Wilderness Ranger."

LESSON 11 • **Perspectives on Leadership**

Objectives:
Students will:
- define leadership and judgement and what role they play in the leadership process.
- brainstorm and identify leadership traits.
- recognize and identify leadership styles in others as well as in themselves.

Background:
A **"Leader"** is defined as "one who influences the behavior of others and helps them reach their common goals and objectives. The leader may direct or guide people into action with a resulting change or improvement in knowledge, skill, or attitude" (Ford & Blanchard, 1993). **Leadership** can be defined as "a process that assists an individual or group to identify goals and objectives and to achieve them." **Outdoor leadership** means that "the setting and program focus are directly related to the natural or cultural environment" (Drury and Bonney, 1992).

What would you expect of an outdoor leader? Your list might include friendly, easy to get along with, both interested and excited about the program. The person should have a good basic understanding of the terrain, the weather, and the potential hazards of the activity. The leader should be aware and concerned about environmental issues and should role model and teach "Leave No Trace" practices. The leader should understand basic psychological and physical needs. A high level of knowledge, skill, and experience in the activity is needed. Knowledge and experience with backcountry first aid and search and rescue are appropriate skills for a leader. The leader should also be able to assume responsibility for all aspects of the trip including: navigating, preparing meals, putting up the tent, personal sanitation practices, and ability to teach and guide others in mastering these responsibilities. It is the leader's responsibility to be aware of current changes in the pursued activity. Another important consideration is the leader's willingness and ability to control and lead (or teach) the group adequately.

The following activities provide opportunities for students to begin thinking about what qualities and traits are important for people in outdoor leadership roles. They will be given a scenario where they are engaged in learning a new and challenging sport and asked what they would expect of their leader. Activity 4 provides a post-field trip exercise in applying critical thinking and analysis skills where students are evaluating leadership traits and qualities in their group that surfaced on the field trip.

Activity 1: Qualities of an Outdoor Leader

Materials:
- chalkboard or flip chart
- markers and tape
- student handout: "Leadership Qualities and Traits"

Duration: 1 class period

Location: classroom

Procedure:

1. Divide the class into small working groups. Ask each group to select a recorder and a presenter. Assign groups the following task: think of people in leadership roles locally, regionally, nationally, and/or internationally. These leaders can be contemporary or historical. Brainstorm a list of 20 leadership traits or qualities you think are important. After generating the list, number them in order of importance.

2. Reassemble for a large group discussion. Ask the presenter from each group to present the top 10 traits from their list.

3. After each group has reported the top ten traits, refine the list to reflect a 20-item master list. Now pose the question, would you select the same traits and qualities for an outdoor leader of a Wilderness expedition? Would the list change? As a large group, generate a master list of the top five traits and qualities. Now prioritize the items on the list. Post the list in the classroom.

4. Present students with the student handout "Leadership Qualities and Traits." Generate discussion on how this list compares with the student generated list. Are the lists similar or very different? Why?

Activity 2: Developing GOOD Judgement

Materials:
- student handout: "Developing GOOD Judgement," pages 167-168.

Duration: 1 class period

Location: classroom

Procedure:

1. Ask students to read the handout "Developing GOOD Judgement."

2. Conduct a group discussion after students complete the reading assignment. Ask them to assume they are expedition leaders responsible for the safety and instruction of a student group.

Discussion Questions:

A. Leadership on a backcountry trip in wildlands involves some of the same factors as an expedition to a high peak in the Himalayas. What are the characteristics of your role as leader?

Possible responses: • teaching skills • logistics • safety • communications

B. You feel a close connection to the land and want your students to adopt a Leave No Trace ethic. How can you convey to them the desire to have a minimum impact?

Possible response:

- affective learning—experiencing the emotion

C. You would like to encourage students to develop good judgement. You have taught them the skills they need. What can you do next?

Possible responses:

- Have them practice skills with you observing and giving them feedback. Present them with real situations where they use their skills to make decisions.

Examples of situations that can help develop judgement:

- Selecting a Leave No Trace campsite
- Planning a route for the day and estimating the time frame for that trip
- Finding a safe river crossing
- Dealing with a simulated first aid situation (make sure students understand it is a simulation and not real)

Realistic situations could include:

- sprained ankle
- headache, nausea, dizziness
- cut
- approaching lightning
- unconscious person

D. You would like to develop a sense of unity and cohesion among your students. What can you do to foster this?

Possible responses:

- Gather the group together in the morning before leaving camp and in the evening after arriving in camp.
- Play games together.
- Share stories.
- Do activities that build trust, both by sharing ideas and feelings in a noncompetitive environment and by doing activities demanding physical trust.

Activity 2: Developing Judgement

STUDENT HANDOUT • **Developing GOOD Judgement**

Sue Giller's thoughts on leading the all-women's Ama Dablam Expedition, 1982, as reflected in a series of letters to her friend Molly, published as the essay, *Post Card* in the anthology *Rock and Roses.*

"Indeed, I never really comprehended beforehand how much being the expedition leader would affect my participation in the climb. Certainly on my last two trips to the Himalaya I saw two distinctly different styles of leadership. I was often critical of how certain things were handled, and I thought of how I might handle those situations myself (better, of course). Now that I personally feel the burden of leadership, I begin to see how it changes the perspective of the leader about what is taking place on the trip. I am no longer just "one of the gang" but an embodiment of some unnamed and unearned "authority", both within the group and to the Sherpas and the Nepalese government. I can no longer act only on my own desires. There is something here much bigger than me.

"I thought my job would largely entail logistics—all those detailed lists of equipment and food, budget projections, and timetables for the movement of people and material on the mountain. Yet I never predicted how all-consuming this attention to logistics would become. I now feel like a mobile computer whose main function is to see that the correct load is at the correct camp in proper time to be used by camps above.

"Because of my self-imposed perceptions of 'leadership' and 'the role of the leader,' I find myself experiencing this trip in a totally different way from any of my other big expeditions.

"The other day, Lucy and I were making a carry from camp I to camp II and we ended up traveling together. We talked about a lot of things, including the difficulty of the route, the best way to rig the fixed lines, how everyone was feeling about the food and each other, and what Lucy felt about the climb and the others. Normally, as a team member, I would just voice my own opinions, enjoy the time as a good gossip session, and not really think about the comments other than how they applied to me personally. This time, however, I found myself analyzing every comment, searching for insight into how team members were feeling. I kept wondering: how does this affect the group overall? Should I worry about so-and-so not liking someone else? What can I do about it? Are these comments signs of unhappiness and discontent with the operations of the trip or just normal grousing? How will all of this affect the achievement of the summit, our success as an expedition? Will Lucy take what I say as just a comment from a fellow climber, or will it be 'The Leader' speaking? We were no longer just two friends talking.

"I am extremely concerned with maintaining the elan on the team—its spirit and unity as a force helping us work together for the summit. As one of the climbers on other trips, I also worried

(Continued on next page)

continued:
about the sense of unity within the team, but I usually felt it was not my 'job' to try to maintain this unity, other than during my own one-to-one interactions with the other climbers. I am not the world's most communicative person, but I feel that the answer to resolving intergroup problems lies in open communications. It is the role of the leader to expedite discussions and to help relieve tensions by serving as a channel for the exchange of feelings among people."

Sue's comments here illustrate the different demands on the leader of a group. The climb of Ama Dablam was successful—all eight women made it to the top without the help of sherpas and no one was hurt. There was relatively little conflict between climbers and the weather was threatening, but not stormy.

Activity 3: Leadership Traits

Materials:

- student handout: "Leadership Qualities and Traits," page 171.

Duration: 1 class period

Location: classroom

Procedure:

1. This activity is best done after a field experience. If you are using lessons from the FIELD EXPERIENCE strand, this activity will compliment those lessons.
2. Before the activity, make two lists of leadership traits and personal qualities observed during the trip. Pick out at least one positive and one negative quality for each participant.
3. Divide the group in two and give each group a list of observed traits of the other group.
4. Split the groups up for a predetermined length of time (30-45 minutes) to do the next two tasks (#5 and #6).
5. Ask each group to match one of the traits with a member of the other group and give an example when the group member exhibited the quality in a positive way.
6. Ask each group to review the traits on their list and discuss which traits were exhibited during the trip.
7. Bring the groups back together to discuss what positive traits they found in the other group and what negative traits were offered within their own group.
8. Wrap up the discussion with an emphasis on:
    a. The importance of observing leaders and working on improving ourselves
    b. The importance of self-analysis
    c. We all have both positive and negative traits

Credit:

The Backcountry Classroom, Lesson Plans for Teaching in the Wilderness, Jack K. Drury and Bruce F. Bonney

Evaluation / Follow-up / Extension

- Ask students to select an outdoor leader, either contemporary or historic to conduct research on. Prepare a research paper describing the adventure, expedition, or outdoor pursuit, the inherent risks and challenges, and traits and qualities the leader possessed. Students will also present this information to the class using props and other teaching aids.

Activity 3: Leadership Traits

STUDENT HANDOUT

Leadership Qualities and Traits

Personal Qualities: poise, cooperative attitude, self-discipline, tolerance, patience, concern for others, neat appearance, physical fitness, dependability, willingness to learn, communication skills, integrity, promptness, self-confidence, enthusiasm and initiative.

Leadership Traits: Qualities recognized as desirable in a leader:

- Achieves objectives
- Understands participants' needs
- Gets along with participants
- Is resourceful
- Gains confidence of participants
- Has the ability to analyze problems
- Is adaptable to situations
- Has the ability to arouse and develop interest
- Leads without dominating
- Has the ability to handle disciplinary problems
- Has the ability to inspire others
- Has the ability to lead informally
- Encourages participant leadership
- Has the ability to plan and organize
- Observes rules and regulations
- Takes proper care of equipment and property
- Uses time effectively
- Is safety conscious, but permits freedom of adventure
- Has the ability to serve as a role model

Credit:
The Backcountry Classroom, Lesson Plans for Teaching in the Wilderness, Jack K. Drury and Bruce F. Bonney.

SOCIAL STUDIES
Leadership Skills

Career Options:

- instructor for NOLS, Outward Bound, or other outdoor experience, expedition leader, environmental educator, Wilderness ranger.

References:

- *Leadership and Administration of Outdoor Pursuits*, Phyllis Ford and Jim Blanchard.
- *The Backcountry Classroom, Lesson Plans for Teaching in the Wilderness*, Jack K. Drury and Bruce F. Bonney.

Teacher Checklist for Planning Field Experience

NOTE TO THE TEACHER/OUTDOOR LEADER:

Listed below is a series of questions you can review before teaching the lessons. Careful planning for a successful field experience is essential for student safety and a positive outcome.

- Is the special project relevant to the discipline objectives of the class/program?
- How does the project fit into the curriculum? Have the expected learner outcomes from accomplishing the project been established?
- What are the interdisciplinary connections?
- Is the project relevant to the students' personal experiences?
- Is the project student-driven?
- Will student motivation and ownership be generated by undertaking the special project?
- Do students possess the cognitive and skill levels necessary for accomplishing the project?
- Will the project include a diversity of learning techniques?
- Have the means of student evaluation been determined?
- Are there any legal considerations or potential insurance problems?
- Will students need to leave the school grounds to complete their special project?
- What special arrangements will need to be made? (Transportation, special passes, parental permission, guest lecturers, special facilities/space, use of special equipment such as computers or telephone, volunteers, chaperones, etc.)
- Has the time frame for the special project been outlined? (When will the students work on their special project? Will students need time outside of class?)
- Will any publicity need to be generated for the special project? If so, have the means to publicize the project been determined?
- In the case of long-term projects, who will be responsible for sustaining the project after the original participants have left?
- Have you contacted the appropriate administrative organization? What special restrictions apply? Are they available to make a presentation to the group?

SOCIAL STUDIES
American Government; Communication Arts; Peer Tutoring

LESSON 12 • **Protecting Open Space**

Objectives:
Students will:
- identify open space and value to wildlife in their community.
- create a plan for its protection.

Materials:
- student handout: "Protecting Open Space for Wildlife", page 174.
- notebook
- maps of local city, county
- transparency/tracing paper with graph lines
- National Wilderness Preservation System (NWPS) map

Duration: 3 to 4 class periods

Location: indoors or outdoors

Background:
Wilderness is not isolated from other public and private lands. The entire ecosystem must be considered in managing and maintaining Wilderness health and integrity. Many wildlife species present in urban and agricultural areas spend part of their annual life cycle in Wilderness. To enhance wildlife habitat for these species is essential. You and your students can contribute directly towards maintaining wildlands by participating in this project.

Through exploring land use planning and zoning in your community, and interacting with local government officials and planners, students can assist with identifying and planning for the protection of these critical areas. Also, private property owners may become involved in this process. Invite field expertise such as city/county planners, Natural Resources Conservation Service, 4-H Extension office, university students and faculty, local conservation organizations such as Audubon, Ducks Unlimited, Pheasants Forever, etc., to participate with you in this project.

As background, students would benefit from participating in lessons from the History, English and the Arts.

SOCIAL STUDIES
American Government; Communication Arts; Peer Tutoring

Activity 1: Protecting Open Space for Wildlife

Procedure:

1. Display the National Wilderness Preservation (NWPS) map or give copies of the map to students as a handout. Ask them to locate the nearest Wilderness. Ask, do you think there are any animal species that spend part of the year outside Wilderness? List ideas on the chalkboard. (Many species of mammals and birds have seasonal migration; most birds, large herbivores and predators would qualify.) What has happened to much of the habitat these wildlife species depend on? (Lost from agriculture, industry, urban development.) How can we help these species survive during their time spent outside Wilderness? List ideas. (Ideas often overlooked include zoning and working with private property owners to protect critical wildlife habitat along streams, wetlands and steep hillsides.)

2. Distribute maps of the city/county (call city/county planner for maps or copy telephone directory maps) and transparency/tracing paper. Using the maps, ask students to locate what they think is open space on both private and public lands (City/county planners may have done this already. If so, use their information). Ask students to identify surface water systems—wetlands, steams, ponds, etc. Ask students these questions: Is any open space protected for wildlife? How can you find out? (Discuss. If students can't tell, they can invite planners, the Natural Resource Conservation Service and conservation organizations to answer these questions). Which areas would be especially valuable to wildlife? List and discuss student-generated ideas.

3. Working in small groups, choose an area from the map. Use the student handout "Protecting Open Space for Wildlife" to create a plan for its protection.

4. After students have completed the student handout, ask each group to discuss their plan. If groups have chosen the same area, have them combine at some point to share ideas and planning to strengthen their efforts.

5. If possible, encourage students to initiate action on their plans. This will involve arranging a trip to the site and meeting with the landowner to discuss the plan. If this isn't possible, invite the owner to visit the class to discuss the plan. After a visit to the site, or by the property owner, ask students to evaluate their plans after discussion with the landowner.

6. If the owner is not willing to cooperate on the effort, think of other strategies such as revising the plan, involving other individuals or professionals, or choosing another area to work with.

Evaluation / Follow-up / Extension

- If you initiate a land use plan, evaluate the outcome, what worked, what didn't, what students would do differently next time.

Career Options:

- land use planner, natural resource manager, field researcher

References:

- "Wildlife Habitat Handbook," National 4-H Council.
- Project WILD, "Wild School Sites, A Guide to Preparing for Habitat Improvement Projects on School Grounds."

Issues and Actions Practicum

Activity: Protecting Open Space for Wildlife

STUDENT HANDOUT

Protecting Open Space for Wildlife

Name or Location of Area:

Ownership: [You may need to contact local government (county recorder) for this.]

Current Uses:

Value to Wildlife: (Ideally, you will arrange a time to visit and rate the area for value to wildlife using this handout. Invite the property owner and representatives from appropriate organizations like the Natural Resource Conservation Service, 4-H staff, city/county/parks, Audubon, Pheasants Forever, Ducks Unlimited, university student or faculty in natural resources, etc.)

a. bird habitat

b. fish habitat

c. mammal habitat

d. reptile/amphibian habitat

e. insect habitat

f. flood water storage and ground water recharge

g. improving water quality

h. other

Human Uses

Type of Use	Uses for Which You Found Evidence	Potential Use	Could Use Affect Wetland Functions?
Education			
Recreation			
Aesthetics			
Food			
Transportation			
Waste Dumping			
Pollution			
Filling			
Draining			
Other			

SOCIAL STUDIES
American Government; Communication Arts; Peer Tutoring

Issues and Actions Practicum

LESSON 13 • **Life-style and Wilderness**

Objectives:
Students will:

- choose and study an issue related to life-style and Wilderness, page 178.
- design a plan of action.
- evaluate the action plan.

Materials:

- chalkboard
- student handout: "Checklist for Field Project," page 179.
- student handout: "Do It! Project Description," page 180.
- student handout: "Project Ideas," pages 181.
- pencil and paper

Duration:
Several class periods, could be a long term project, length and time spent will vary with the project chosen.

Location: classroom and outdoors

Background:
Virtually every action taken by a student has some impact on Wilderness: as a consumer, member of a democratic society, and visitor of Wilderness. The small amount of wild lands remaining in the lower 48 states, estimated somewhere between 2 and 3 percent, is a direct result of our resource-intensive life style. Wildlands are threatened by air and water pollution, water diversions, overuse by recreationists, grazing and other activities of an industrialized society whose populace continues to demand more Wilderness experiences.

Students will identify and select an issue to study. A partial list is included, but should not be given to the students until they have had an opportunity to develop their own.

SOCIAL STUDIES
American Government; Communication Arts; Peer Tutoring

Activity 1: Life-style and Wilderness

Procedure:

1. Ask students if there is anything they do in their daily lives which in some way affects Wilderness. Record ideas on the chalkboard. Ask how different actions may affect Wilderness. Examples: Failure to recycle increases the demand for raw materials in wild places—dams and mines may be built to meet the demand. Failure to protect critical wildlife areas, such as streamside vegetation and wetlands, adversely affects those species that spend part of their life-cycle in Wilderness.
2. Divide students into small working groups. Pass out student handouts to complete.
3. Review instructions for each group to identify the issue they have chosen to work on. Each member of the group will identify the specific roles they will serve on the issue.
4. Conduct the project. Offer feedback and guidance through the project.

Evaluation / Follow-up / Extension

- see student handout "Project Ideas" for ideas.
- organize media coverage to highlight student projects

Career Options:

This project may lead to contact with resource people who could serve as mentors to team members. Invite resource people to present to your class.

References:

- *The Kid's Guide to Social Action*, Barbara A. Lewis.
- *Keeping it Wild, A Citizen Guide to Wilderness Management*, The Wilderness Society and U. S. Forest Service.
- *Audubon Activist Tools, You Can Make a Difference*, National Audubon Society
- *How to ... Take Action, A Series of Citizens Guides*, Western Organization of Resource Councils.

Activity: ***Issues and Actions Practicum***

STUDENT HANDOUT • **Checklist for Field Project**

The keys to doing a successful project are:

- Find a project that is interesting to you and that you truly want to do.
- Plan your project carefully and realistically.
- Be willing to make commitments and keep them.
- Turn problems into learning experiences, solve them, and continue learning.
- Keep your mind on your real goal. Be flexible, but keep moving toward your objective. Don't let egos and personalities get in the way.

DATE	STEPS TO A SUCCESSFUL PROJECT
_______	Think of ideas. Talk them over. Envision what will be done and what the project will accomplish. What problems will be encountered and how will they be addressed? Find a project that you really want to do.
_______	Begin working on the project. • Find and contact local people who can help or whom you can help. • Consult libraries or people for information. • Gather materials. • If necessary, send or telephone for information. • Get to work! • Seek help if you need it.
_______	First Progress Report due.
_______	Second Progress Report due.
_______	Third Progress Report due.
_______	Actual project to be done.
_______	Write report and/or plan oral report.
_______	Submit written report, questions, give oral report, or other assignment.

Activity: ***Issues and Actions Practicum***

STUDENT HANDOUT • **Do It! Project Description**

Project Title: ____

1. **Goal:** What, as exactly as possible, do you hope or expect to accomplish by doing this project? In what way will the environment be helped? What is the connection to Wilderness?

____

____

3. Steps to reach the goals: (Be as specific as possible. Include target dates.)

(1) ____

(2) ____

(3) ____

(4) ____

(5) ____

(6) ____

(7) ____

4. What problems do you anticipate?

____

5. What help will you need?

____

6. Where might you get help? (People, agencies, organizations, etc.)

____

7. Are there any safety issues about which to be concerned?

____

8. When do you plan to actually start the project? __________ Finish? __________

9. How will you evaluate your project? How will you know whether you achieved your goal?

____

____

Activity: ***Issues and Action Practicum***

STUDENT HANDOUT • **Project Ideas**

1. Contact a local conservation organization and participate in one of its projects.

2. Organize a wilderness essay or poster contest for younger students.

3. Arrange to do some public-service announcements on local radio or television about Wilderness.

4. Establish a Wilderness display and booklist at local libraries and bookstores.

5. Write a letter to the editor of your local newspaper and school newspaper about Wilderness issues.

6. Start a Wilderness issues column in your school newspaper.

7. Make up a skit, song, or rap about conservation or a Wilderness related issue. Perform it in public or at school.

8. Volunteer to work with recreation, YMCA/YWCA, or other groups to lead nature hikes for kids. Talk to them about the importance of wild places.

9. Organize an "Earth Day" program/assembly for your school or other schools.

10. Arrange for political candidates to discuss Wilderness issues with interested classes.

11. Arrange a Wilderness action bulletin board at local libraries and book stores.

12. Translate information on Wilderness issues into another language.

13. Organize a career day for natural resource management careers and/or set up a display on the same day by the counselor's office.

14. Conduct a natural resource game day where traditional games will be redesigned to provide a conservation message, board games that teach about wise use of our resources, computer simulation games, etc.

15. Organize an art show focusing on Wilderness themes.

16. Develop and present a slide show/video featuring a Wilderness management issue.

Activity: ***Issues and Action Practicum***

STUDENT HANDOUT • **Project Ideas continued**

17. Write and present a play, puppet show, skit or musical performance about a Wilderness topic.

18. Suggest Wilderness issues for a debate class/meet.

19. Write letters on a natural resource issue related to Wilderness.

20. Promote a fund-raiser event and use the proceeds to help with a Wilderness management problem.

21. Speak at a public hearing on a Wilderness issue.

22. Conduct a survey and publish the results on a Wilderness issue.

SOCIAL STUDIES
American Government; Communication Arts; Peer Tutoring

Teaching Practicum

LESSON 14 • Teaching a Wilderness Lesson

Objectives:
Students will:
- prepare and present a lesson to a group or class on a wilderness concept.
- evaluate teaching experience.

Materials:
- student handout: "Planning Your Presentation," page 185.
- student handout: "Presentation Checklist," page 186.
- student handout: "Wilderness Lesson Evaluation," pages 187-188.
- copies of "Teaching Practicum, K-8 Lesson Plans"—student handout, pages 189-201.
- student handout: "Self Evaluation for High School Students," page 187.

Duration: 3 or 4 class periods

Location: indoors or outdoors

Background:
Teaching is an effective way to internalize and gain understanding of a concept. It is especially effective when younger students are being taught by their peers or by older students. In this lesson high school students have the opportunity to teach K-8 students. Administrative approval must be obtained before beginning this activity. Students can assist with contacting the group or school. Students will become familiar with lessons from the "Teaching Practicum, K-8 Lesson Plans" and teach one lesson.

Procedure:
1. Explain to the students that working in a group, they will have an opportunity to select, prepare, and teach a lesson on Wilderness to younger students. Student groups will select a lesson from the "Teaching Practicum, K-8 Lesson Plans"—student handout.

2. Break students into small working groups. Distribute "Teaching Practicum, K-8 Lesson plans"—student handout. Allow 10 - 15 minutes to review and select a lesson their group will teach.

3. Distribute student handout "Planning Your Presentation" to each group. Allow 20 - 30 minutes to complete.

4. Distribute the student handout "Presentation Checklist" to student groups and appoint someone in each group to read it. Follow up with a discussion so groups feel confident they will be able to meet the criteria on the checklist. Have each member of the group sign the checklist confirming they are comfortable with their role in the presentation according to the handout.

5. Call the class to order and allow each group to ask questions and express concerns on

their presentations. Allow students to assist with ideas on the questions and concerns. After discussion, collect student handouts for evaluation. Return handouts to students within a few days with your written comments. Have additional discussion if necessary.

6. Ask students to make contacts with teachers and group leaders to schedule student teaching sessions. Provide students with a two-week time frame to make their presentations.

7. After a few days, ask each student group to confirm their scheduling.

8. Conduct a practice session. Ask student groups to present their lesson to classmates before presenting to the selected audience. Solicit constructive feedback and make changes or improvements.

9. Conduct lessons. Provide time for students to share their teaching experience.

10. As groups complete their presentations, have them share with the class how things went. This is very helpful in getting other groups excited and offering ideas on what worked well, or what they would change. Have them turn in the student handout "Wilderness Lesson Evaluation" which has been completed by the teacher or group leader. Share comments from the handout with the class.

Evaluation / Follow-up / Extension

- Evaluate student handout assignments.
- Ask students to schedule another class or group.
- Ask students to present a different lesson.
- Have students make a presentation to a group of adults.

Career Options: • teacher • outdoor educator • Wilderness ranger

References:

• *Wilderness and Land Ethics Curriculum*, K-8, Arthur Carhart National Wilderness Training Center.

Activity 1: ***Teaching Practicum***

STUDENT HANDOUT • **Planning Your Presentation**

1. Choose school and grade, also teacher if known.

    School______________

    Grade_______

    Teacher______________

2. Choose or create a lesson plan

    Lesson Plan Title_________________

3. Decide what needs to be done according to your lesson plan

    a) introductions (introduce group)
    b) introduce a lesson (include some questions for students)
    c) activity 1
        activity 2
        activity 3
    d) closure, extension: (summarize and tie together, extensions are included in lesson plans)
    e) evaluation by students being taught
    f) evaluation by teacher
    g) contact teacher and schedule
    h) thoroughly read activities and make a list of supplies and equipment
    i) gather material/equipment
    j) arrange transportation

4. Assignments: Assign who will be responsible for each of the above

    Name:________________________Assignments ____________
    Name:________________________Assignments ____________
    Name:________________________Assignments ____________
    Name:________________________Assignments ____________
    Name:________________________Assignments ____________

5. On items a - e, have the responsible student(s) write a page detailing what they are going to do. Once they have finished, have them read their plan to the group for feedback. Make final revisions based on feedback from group, then turn in to teacher.

Activity 1: *Teaching Practicum*

STUDENT HANDOUT • **Presentation Checklist**

The following ideas may help to make your presentation more enjoyable for you and the students you are presenting to.

____ Try to relax and smile, it's contagious! Have fun!

____ Be prepared, rehearse in your group before actually doing it so it flows smoothly.

____ Questions: Use lots of questions for the students. It keeps them involved.

____ Wait time: After asking a question, wait several seconds for them to respond. You may wish to rephrase the question to get at what you want.

____ Transitions: When moving from one activity to another, have the next person/activity ready to flow smoothly.

____ Summarize: After each activity, have a few brief summary questions for the students before moving on to the next.

____ If students ask a question you don't know, tell them! None of us will ever have all the answers. Ask other students if they know the answer, or the teacher.

____ Thank them for their time and cooperation.

____ Provide the teacher with extension options so learning about Wilderness is not just a one time presentation.

____ Use vocabulary appropriate to age levels; write words on the chalkboard or flip chart.

____ Eye contact: • be aware of student interest/non-interest
  • get "down" to student level

____ Keep directions simple; do not distribute handouts until you have completed the directions.

Activity 1: *Teaching Practicum*

STUDENT HANDOUT • **Wilderness Lesson Self Evaluation**

This is an evaluation form for high school students to complete AFTER they have taught a lesson

Names ________________________________ Presentation Date____________

Lesson ________________________________ Length of Presentation________

Teacher____________________ School________________Grade Level__________

Estimate time to prepare your presentation__________________

1. Were you comfortable with your presentation? Yes _______ No _________

2. What did you learn from this experience?

3. If you could do it again, what would you do differently?

4. Your overall evaluation of the presentation (circle one)

Fair Average Good Excellent

Activity 1: *Teaching Practicum*
STUDENT HANDOUT • **Wilderness Lesson Evaluation**

(To be completed by classroom teacher where lesson is being taught by high school students)

1. Names of students presenting:

2. How did your students respond?

3. Was the presentation well organized? Were the high school students prepared?

4. What might students have done differently to make it a better experience for your class?

5. Was the age level of the presentation appropriate?____Too high____Too low____

6. Was the presentation too long____Too short____or just right____for the grade level?

7. Was there enough interaction with your students? Yes_____ No____

8. Do you feel this was worthwhile for your class? Yes____ No____
   If yes, would you consider having another similar presentation in the future?

THANK YOU FOR YOUR HELP! (your name, school and telephone number)

Teacher Name:

School and Grade:

Home Phone: (optional, but it makes it easier to contact you)

Teaching Practicum, K-8 Lesson Plans—Student Handout

LESSON
Introduction to Wilderness, Primary, Grades K-2

Objectives:

- Students will identify similarities and differences between their home and wild environments.
- Students will demonstrate awareness of Wilderness as a place not developed by or for humans.

Background:
Many children have never visited Wilderness, though they may have images from stories or movies of what such places would be like. Drawing on students' own experiences and perceptions, these activities introduce the concept of wilderness by contrasting wild places to developed places. The levels of distinction students make will vary with their experience, age, and the location of your community. A good definition of Wilderness for this age group, for your own reference, is that of a place influenced by the forces of nature, where people visit but do not live.

Progression:
Activity 1 introduces students to wildlands through a guided imagery activity. In Activity 2 students gather images of wild places from magazines and other resources to create their own impression of Wilderness.

Activity 1: Magic School Bus to the End of the Sidewalk

Duration: 15 to 30 minutes

Materials:

- 3 large pieces of butcher paper or a flip chart
- A tape with "wild" sounds played in the background while the story is told would enhance

Procedure:

1) Based on your readings of the background, share with students your own definition of "wildlands" or a "wild place." You might also ask them to share their perceptions of these words with you.

2) Tell students you are going to take an imaginary trip to a place that is wild. Create your own story or use the following scenario to stimulate students thinking. Students could quietly act out the story you describe. You may even wish to arrange chairs as the seats of a school bus and have students "climb aboard."

"Imagine we are all going to pack our backpacks with water, food and other things we will need to be outside all day. We are going to travel in our magic school bus...everyone aboard

Teaching Practicum **continued:**
and take a seat. We'll drive through town, past all the neighborhoods until we can't see highways or stores or gas stations on a dirt road passing farms and ranches. We are driving a long time. It is such a long way that everyone goes to sleep! The bus keeps moving until finally it stops at the edge of a wild place. You can hear a few quiet sounds of birds singing and the water in a creek nearby. It smells clean and suddenly you can feel grass under your feet. The school bus has disappeared, but it will be back soon. Before you open your eyes, make a picture in your mind of what you might see in this wild place."

2. On one paper labeled "Wild" write down images as students share them. A helpful hint: remind students that in this place there is nothing that is "human made," aside from what is on or with them. Encourage students to be specific in their descriptions. Also have available a paper labeled "Wild" and "Developed" on which to record this category. For example, people belong in both places, but many of their actions are different in response to their surroundings. Plants and animals live in both places, though species may differ and even the same species may use different behaviors.

3. Finish off by getting back in the school bus and coming back to your classroom. On the other piece of paper labeled "City," "Town," or "Developed," write down all the things you see as you come into a developed area from your imaginary journey. Save these papers for Activity 2.

4. Compare the two. What are the similarities? Differences?

Activity 2: Wilderness Collage

Duration: 30 minutes

Materials:
- scissors
- glue
- paper
- magazines (to cut up)

Procedure:
1. Review the words generated in Activity 1.

2. As a large group, small groups, or in pairs, use the magazines to cut out pictures and make collages of things that might be found in wild places on one page and those found in cities or towns on another. And if you wish, also create a category for both. Note that people may be in both collages. With older students you may wish to have them create collages, or make illustrations around the words "Wilderness" and "City".

3. Have students share their work with the group.

Teaching Practicum, K-8 Lesson Plans

STUDENT HANDOUT

Introduction to Wilderness, Elementary, Grades 3 - 5

Objectives:

- Students will explain five concepts or feelings they associate with wild places.
- Students will describe how wild lands are an important part of our national heritage and a source of pride for Americans.
- Students will examine the spiritual value that many feel in wilderness.
- Students will locate and label the classified Wilderness areas in or near their state.

Background:

This lesson is designed to introduce students to the idea of wilderness. The first activity is simply a word association game to encourage students to think about what wild means to them. There are no wrong answers, and a discussion can really help to open up a new world of thinking. The Wilderness slide show provides an array of slides from the National Wilderness Preservation System. "The Last Parable" video is a beautiful elaboration of traditional American wilderness values and feelings. Its wildlife shots are truly captivating for every age audience.

Activity 1: Wild Words

Duration: 30-45 minutes

Materials :

- blackboard • maps

Procedure:

1. Ask students to write down five or more words they associate with wilderness. Write all the words on the chalkboard.
2. Explore the feelings associated with the word wild: How does the word make you feel?
3. Now add "erness." Wilderness areas are **places** that are wild. What does that mean? You can use a national forest, park, refuge, BLM area or state map to point out the Wilderness areas.
4. Talk about the roots of the word wilderness, meaning wild; will, to have will.
5. Have them write a short story using as many of the words on the board as possible (optional).
6. What are some things you do that are wild? Are cities wild?

Extension:

- Categorize words. This gives more possibilities when writing a story and teaching grammar. Examples:

Noun	Verb	Adjective	Adverb
mountains	rumble	majestic	lively

Activity 2: Wilderness Slide Show

Duration: 30-45 minutes

Materials:

- Wilderness Slide Show • screen • slide projector

Procedure:

Read the introductory script and show the slide program. Have the students look for diversity of ecosystems, plants, animals, recreational activities, etc. A handout accompanies the script.

Extension

- Have students view the slides, then pick out music they feel brings out the values and beauty of wilderness. Then play the music with the slides for more of an aesthetic approach.

Evaluation:

Have students discuss the different ecosystems they saw. Ask:

- What plant types were in the slide show?
- Name the different animal species?
- Why is wilderness important?
- What types of recreational activities were shown?

Activity 3: The Last Parable video

Duration: 45 minutes

Materials:

- video: "The Last Parable"
- VCR and monitor
- several dictionaries
- teacher Information page: "The Last Parable" discussion questions

Procedure:

1. Complete the "Wild Words" activity and watch the Wilderness Slide Show as prerequisite student background information before conducting this activity. Some of the concepts in this tape will be difficult for elementary students. However, the image of humans as "the unicorn," in search of our home, our roots, and ourselves, in the Wilderness is one that they can understand with some interpretation.

2. Ask students to look up definitions in a dictionary for these words: myth, legend, story, and parable. Ask for volunteers to look up each word.

3. View "The Last Parable" video with students.

4) Make up your own discussion questions or use the questions that accompany this activity.

Extension:

"Wild Words" can be extended by creating a "word web," spatially connecting the words that students generate on the board, with descriptions of their connections and relationships. After seeing "The Last Parable," consider returning to the words generated in "Wild Words". Ask the students if any of their feelings about these words have changed. What words would the Wilderness travelers in the video have used to describe Wilderness?

Evaluation:

- Evaluate short stories students write in Activity 1: "Wild Words".
- Use discussion questions as an evaluation of what students have learned about Wilderness and wildlife.

Activity 3: The Last Parable Discussion Questions

1. List at least 10 wildlife species viewed in the video.

Possible responses:

sage and sharp tailed grouse
coyote
badger
golden eagle
mule deer
grizzly bear
great blue heron
water ouzel
moose
trout
trumpeter swan
prong horned antelope
elk
Canada goose
white tailed deer
black bear
cedar waxwing
big horn sheep
river otter
bald eagle
wood duck

2. Explain how you felt when you watched the grizzly bear chase down the elk calf.

   Possible response:

   Answers may vary.

3. Share a special wild place you have visited or would like to visit.

   What was it like?

   What did you like best? Least?

   What kinds of wild animals did you see?

Teaching Practicum, K-8 Lesson Plans

STUDENT HANDOUT

Wilderness Skills, Primary, Grades K-2

Objective:

- Students will describe five essential items to take with them on a day hike, and describe what to do if they become separated from an adult in a wild place.

Background:
Some children may think little of the difference between going on a day hike and a trip to the store. For other children the thought of going into a wild place may connote scary animals and dark nights spent out, lost and alone. The following activities provide students with knowledge of ways in which they may be safely prepared for and enjoy a day outing in a wild place.

Activity 1 can be done with your own equipment and expertise, or it is a great opportunity to involve a natural resource manager or interested parent. Invite them to visit and bring their own backpack and experiences into your classroom. Activity 2 emphasizes safety measures and also provides knowledge of what to do when lost.

Activity 1: To Bring or Not To Bring

Duration: 30 minutes

Materials: Check your hall closet, garage, basement, & kitchen for these items:

Essentials
poncho or raincoat
water bottle and water
food
whistle
wool shirt or sweater
backpack (large or small)
map (with person able to read it!)
first aid kit
sun screen/hat/glasses
dry socks
gloves

Optional
field guides
camera/binoculars
pocket knife (adult use only)
matches (adult use only)

Inappropriate
dictionary (field guides are lighter)
tape player
electric toy
canned food (heavy)
high heeled shoes

Procedure:

1. Review the basic needs of all animals including ourselves and discuss how people meet these needs when they are in wild places. Brainstorm some things you might bring to meet these needs.

2. Use your own style of presentation or dramatics to divide materials into those that should go on an all day hike and those that should stay at home. Play the foolish hiker, dress in inappropriate clothes, and come into the classroom with a huge bag of all the materials described above. Discuss each item and have students sort materials into two piles explaining their reasoning as they do so. Some important considerations are usefulness, weight, and the item's ability to meet basic or safety needs. Emphasize preparedness as a way of safely enjoying the outdoors.

3. Conclude by making lists of items to bring, leave, or those that are optional. Some classes might enjoy making up their own skits using these materials.

Activity 2: Don't Forget

Duration: 15 to 30 minutes

Procedure:

1. Discuss the information described below as you lay out the items listed in Day Hike Basics on the floor.

2. To play the "Don't Forget" game, cover the items with a cloth and remove one item while students eyes are closed. Students open their eyes and you uncover the items. Have students guess which item is missing and discuss the possible consequences of forgetting this item on a day hike.

Day Hike Basics

First Aid Kit

In wild places a long way from your home or school, it is essential to have one member of the group carry a first aid kit with basic supplies and have a basic knowledge of first aid skills.

Extra Food

Light, high energy snacks with little packaging are best, for replenishing energy and keeping you warm in case the trip is longer than planned.

Water

It is easy to get dehydrated when exercising outdoors and water from natural sources should not be used unless treated for giardia and other microorganisms that cause intestinal illness.

Sun Protection

Especially at high altitudes, overexposure to sun can cause severe sunburn.

Extra Clothes

Mountain weather can change quickly. The warm weather clothes you start out with may not be adequate for cooler temperatures or higher elevations.

Poncho or Rain Jacket

Essential for rain or wind protection. Many students may not have these items. A large trash bag with a hood created out of hole in the bottom, is an innovative and inexpensive emergency item. If you share this with your class **be certain** to distinguish between this activity and simply putting a plastic bag over your head!

Whistle

To be used only in an emergency to help locate a lost person.

Tell someone where you are going and for how long.

3. This is a good place to emphasize preventative safety, i.e., staying with the group, being prepared for changes in weather, or being out longer than planned. Convey to students that if they are lost and cannot see a trail, road, or any signs of other people they should stay where they are. They should make themselves comfortable and remember that someone will come looking for them. If they hear people calling they should always answer...they won't get in trouble for being found!

Teaching Practicum, K-8 Lesson Plans

STUDENT HANDOUT

Where Is Wilderness? Middle School, Grades 6-8

Objective:

- Students will know, identify and label the location and distribution of Wilderness areas in the U.S. and in their state.
- Students will compare and describe differences between Wilderness areas.

Background:

The National Wilderness Preservation System includes federally designated Wilderness areas within National Parks, Forests, Fish and Wildlife Refuges, and as Bureau of Land Management Lands. The following activities help to inform students of the location of Wilderness areas in the United States. Encourage students to question why these areas might have been established in these particular geographic locations in terms of American history, topography and cultural values.

The book "American Wilderness: 25 Years" provides an excellent resource for information about the features and history of Wilderness areas in different regions of the United States.

Activity 1: National Wilderness Preservation System

Duration: 45 minutes

Materials:

- National Wilderness Preservation System Map
- handout: "National Wilderness Preservation System Map"
- book: "American Wilderness: 25 years"

Procedure:

1. Briefly introduce the main features, color key, and symbols of the map. You may wish to address the maps with the whole class, or combine this activity with the state map activity so that different groups could work with maps at different locations of your classroom.
2. Distribute "National Wilderness Preservation System" handout. Students may complete handouts individually or as teams.
3. Review and discuss handouts. Some thought provoking questions might be:

- Where are the largest areas of Wilderness in the western US? Why do you think they are in this region? What other regions could/should have been considered. Why? Why not?

- What is the relationship between this pattern and the location of large population centers?
- Are most of these areas in mountains or plains? Why do you think this pattern has developed?

Activity 2: State or Regional Wilderness Areas

Duration: 45 minutes

Materials:
- State or Regional Wildernesses Map
- handout: "State/Regional Wilderness areas"

Procedure:

1. Follow the same procedure as that described in Activity 1, using the above materials and the "State/Regional Wilderness areas" handout.
2. Questions specific to states are:

- Note the closest Wilderness areas to your community. Can you see it from your school? Your house?
- Why are there so few Wilderness areas in some parts of your state?

Extensions:
- Research Wilderness management in other countries. Check the Internet, your school or community library for resources. Look for the *International Journal of Wilderness*.
- Research information on the passage of the most recent state Wilderness Act.
- Select another state that has Wilderness and complete the student handout.

Evaluation:
- Name and locate five Wilderness areas in your state. List total acreage, geographic location, and agency who manages each.
- Grade "State/Regional Wilderness areas" handout. Conduct pre- and post-tests using the handout.

"I am glad I shall never be young without wild country to be young in. Of what avail are forty freedoms without a blank spot on the map?" — Aldo Leopold

HANDOUT • State/Regional Wilderness Areas

Use the "State/Regional Wilderness Status" map to answer the following questions:

Which color is used to designate Wilderness Areas managed by the
U.S. Forest Service?_______________________
National Park Service? _______________________

Are there Wilderness Areas in your state?
If so, where, in general, are most of them?________________

What is the landscape like in these places?___________________________________

Locate and name the nearest Wilderness to your community.
What is it called? Which agency manages it?
____

Can you see this Wilderness from your school?______ From your home?__________

Imagine you are giving directions to someone else to tell them how to get there. What would you say? What other communities would you go through? Write a description or draw your own map.

Challenges:
If you were driving an average of 55 miles per hour, how long would it take you to get to the nearest Wilderness?_________________________

HANDOUT
National Wilderness Preservation System Map

Use the "National Wilderness Preservation System" map and information to answer the following:

On this map which color is used to represent Wilderness areas managed by the

National Forest Service?____________________________

National Park Service?______________________________

Bureau of Land Management?_______________________

Where in the U.S., in general, do you notice the most land designated as Wilderness?

____

Name some states that have more than 15 Wilderness areas:____________________

____

Which state has the greatest number of Wilderness areas?_______________________

Which state has the largest total amount of acres in Wilderness?__________________

Name a Wilderness that is in more than one state.______________________________

What is the largest Wilderness in the US? Where is it?__________________________

Smallest?___________________ Where is it?___________________________

What is the Wilderness that is farthest north in the US?______________________

East?________________, West?_________________, South?_______________

When were the first Wilderness areas in your state established? (If there are two dates the earliest is when the area was first established and the later one is when land was added.)

____

Name one of these ____________________________

Are there any Wilderness areas that were established in the year you were born?

____

Choose a Wilderness you would like to visit. Record the following information:

State _____________________________ Year designated________________

Acres_______________ Agency____________Public Land Unit______________

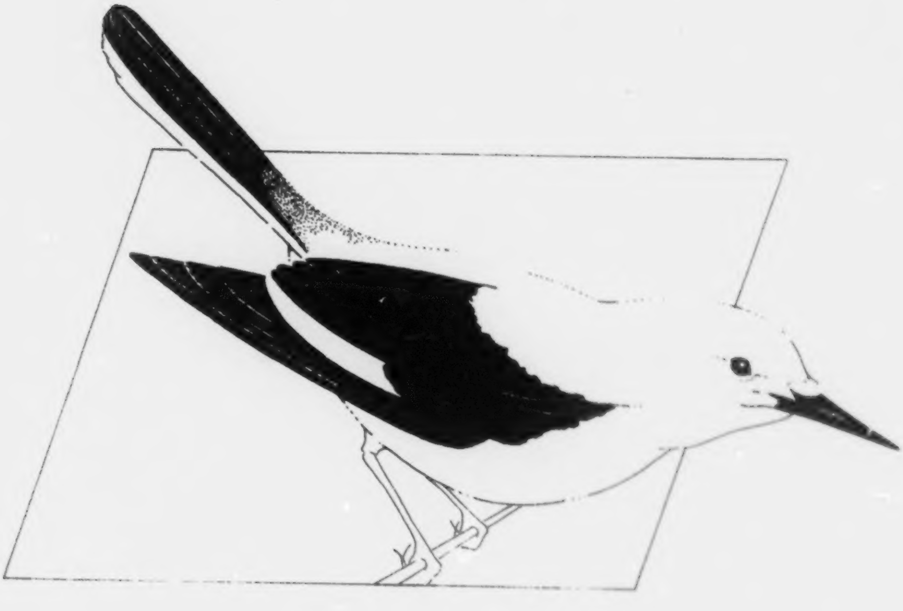
(The public land unit is the specific organization within the agency that manages the Wilderness, ie: National Park or National Forest.)

Why did you choose this Wilderness?

Why might it be an important area to preserve?

What areas do you think should be considered for Wilderness designation but are not? Why?

AMERICAN HISTORY



LESSON 1: **What is Wilderness?**

Objectives:
Students will:

- create their own definition of what the concept of wilderness means to them.
- read excerpts from "The Wilderness Act of 1964" and compare and contrast their conceptual definition to the legal definition.
- complete art and creative writing activities about wilderness.

Duration: 1 to 5 class periods

Location: indoors or outdoors

Background: For background information, read the teacher/student handout "Defining Wilderness" page 205.

Activity 1: What is Wilderness?

Materials:

- teacher/student handout: "Defining Wilderness", page 205.
- journal or notebook
- pen or pencil
- National Wilderness Preservation System (NWPS) map

Procedure:
1. Have students individually write down all the words they associate with wilderness. Provide at least 5 minutes.
2. Ask students to select one to three words from their list and record these on poster board or chalkboard.
3. Help students see how many different definitions there are for wilderness. We all may have a different personal definition for wilderness.
4. Explain to students that there are no right or wrong definitions. Wilderness means different things to different people and often their definitions are based on life experiences.

Procedure continued:

5. As a group or individual activity, have students read and discuss "Defining Wilderness" student information sheet. Discuss the different definitions and perceptions people have about wilderness. Explore the feelings associated with words. Ask students how the word makes them feel? What are some things they do that are wild? Are cities wild?

6. Ask students to write a short story using as many of the words on the board as possible. Stories should be at least one page.

7. Use a national forest or state map from your local area and locate Wilderness. Examine the National Wilderness Preservation System map. Locate Wilderness in other states and regions. Does each state in the United States have Wilderness areas?

Evaluation / Extension:

- Evaluate short stories students write about Wilderness.
- Using maps, ask students to locate Wilderness in their state, region and around the country.

Activity 1: What is Wilderness?

TEACHER/STUDENT HANDOUT•Defining Wilderness

Defining Wilderness

Roderick Nash, Wilderness Historian, tells us that Wilderness is a difficult word to define. While the word is a noun, it acts like an adjective. And no specific physical object that is wilderness. There is no universal definition of wilderness. He believes that wilderness is so heavily weighed with meaning of personal, symbolic, and changing kind that it is difficult to define.

In early Teutonic and Norse languages, from which the English word developed, the root word, "will" meant "self-willed, willful, or uncontrollable." From "willed" came the adjective "wild" used to convey the idea of "being lost, unruly, disordered or confused." Applied initially to human conduct, the term was extended to wildlife or wild animals as "being out of control of man." Other Europeans defined wilderness as "deserted places" and "lacking of cultivation". The idea of a habitat of wild beasts implied the absence of men, and wilderness was conceived as a region where a person was likely to get into a "disordered, confused, or wild condition."

Even in today's dictionaries, wilderness is defined as uncultivated and otherwise undeveloped land. The absence of people and the absence of wild animals is a common, modern-day perception. The word also designated other nonhuman environments, such as the sea and, more recently, outer space. The usual dictionary meaning of wilderness implies "hostility on man's part," but the term has also developed positive meanings. On one hand wilderness is inhospitable, alien, mysterious, and threatening. On the other, wilderness is beautiful, friendly, and capable of elevating and delighting us.

Today some define wilderness as a sanctuary in which those in need of consolation can find respite from the pressures of civilization. Bob Marshall, champion for wilderness, demanded an area so large that "it could not be traversed without mechanical means in a single day." Aldo Leopold, wilderness visionary, set his standard as "an area's ability to absorb a two weeks pack trip."

A century-old movement to protect wild country reached its peak with the creation of a National Wilderness Preservation System, passed into law by Congress as the Wilderness Act of 1964. According to its authors, the Wilderness Act defined wilderness, "in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the Earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." The act went on to require that a wilderness retain "its primeval character and influence" and that it be protected and managed in such a way that it "appears to have been affected primarily by the force of nature." Some Native American cultures do not have a word for wilderness nor do they protect land as officially designated Wilderness. They believe all land should be respected and all land is used only for survival, whether it be physical, spiritual or mental. If asked, we all have a different and unique definition for what wilderness means to us.

Credit: *Wilderness and the American Mind*, Roderick Nash, Yale University Press, 1982.

GREEN

CITIZEN ACTION

Activity 2: Citizen Action, the Wilderness Act

Background:

In this activity students will develop action plans to help resolve concerns about local issues. Before starting their own actions, however, they will study the Who? What? Why? and How? of the citizen action that led to the United States' protection of wilderness areas.

Students will use the example of those who promoted passage of the Wilderness Act of 1964 as a lesson on how they, too, can make a difference in protecting the natural environment. They will be given facts about wilderness and the Wilderness Act and will use this information in a "trivia" game. Skills stressed include reading comprehension, information retrieval, writing and answering questions, problem solving, and reporting.

If the students need incentives to help each other understand the information, you and/or the students can design a point system.

When people are concerned about an issue they can either work on it individually or organize into groups. The passage of the Wilderness Act is one good example of how a group of concerned individuals were able to affect national policies on public lands and the natural environment.

The major purposes of this activity are to help students explore local environmental concerns and recognize ways they can help solve them, and make students aware of the citizen involvement in establishing and implementing the Wilderness Act, which occurred because a few people felt it was important and took action on its behalf.

It only takes a few people to affect the outcome of an issue. The issues your students select should be relevant to them, and potential solutions should be ones they can follow up on both inside and outside of school.

In addition to reading all of the fact sheets provided to the students, the teacher should know that:

- The value of wilderness cannot be measured in dollars. It is hard to compare the worth of wilderness with the worth of resources like timber and minerals, which we take from federal lands not designated wilderness or national parks.

- Wilderness resources include: wildlife, pristine watersheds, wild rivers, scenic beauty, and the last remnants of nature's works, millions of years of evolving landscapes, where human influence is essentially imperceptible.

- Nearly 4% of all the land in the United States is protected by the Wilderness Act from any development and is now part of the National Wilderness Preservation System. Wilderness areas are managed by four agencies of the federal government: United States Forest Service (USFS), which is part of the Development of Agriculture; and three agencies in the Department of the Interior: The Bureau of Land Management (BLM), the Fish and Wildlife Service (FWS), and the National Park Service (NPS).

- In most cases, hunting and fishing are permitted on Wilderness lands with the exception of National Parks, where hunting is not permitted.

- Occasionally, new additions are made to the National Wilderness Preservation System. For information on Wilderness areas recently added or on areas currently being considered for Wilderness designation, contact Federal land managing agencies or one of the Wilderness Society in Washington, D.C.

Group Set-Up

Part 1:

- Teams of four given fact sheets
- Teams of four select extra trivia cards
- Two teams join for "trivia" cards

Time:

- The reading and question-writing time could range from thirty minutes to an hour. Playing time for the trivia game will vary depending on the amount of time teams take to confer about their questions, but should not exceed thirty minutes if the 20-second conference time is followed.

Part 2:

- Whole class brainstorms a list of local concerns
- Teams of four select a concern, plan solutions, present to class
- Class votes on which action projects to pursue

Time:

- 2 or 3 forty-five minute periods to class vote

Materials and Preparation

Part 1:

- The Wilderness Act Fact Sheet (What), make one copy per team
- Why Wilderness? Fact sheet (Why), make one copy per team
- A Wilderness Ethic Fact Sheet (Who), make one copy per team

- The National Wilderness Preservation System Fact Sheet (How), make one copy per team
- Wilderness Trivia Game Rules, make one copy per team
- Wilderness Trivia Cards, one copy per two teams; cut along dotted lines
- Blank Trivia Cards, one copy per team, each student gets three blank cards
- The National Wilderness Preservation System poster , or make one copy per team of the National Wilderness Preservation System map to be used by the HOW group; hang up a week prior to activity to increase interest in wilderness. Four dictionaries (one per group), scissors (one pair per team)

Part 2:

- Local Concerns Action Plan, one set of four parts per team. Art supplies for presentations

Procedure:

Part 1:

1. Introduce the activity by explaining that students will play a trivia game about Wilderness areas after they have learned all they can from information provided on fact sheets. Each team member will be responsible for different information, so it is important that they all try to remember as much as they can from their fact sheets.

2. Have students sit with their teams of four and pass out a different fact sheet to each student within the team. (Make teams of five with extra students and assign them to the National Wilderness Preservation System group.)

3. Students will then leave their team and join a larger group of students who have the same fact sheet. The fact sheets can be identified by different pictures and by the Who, What, How, Why. Students should read their first fact sheets and help each other understand the information provided. Dictionaries will assist the students' discussions. Using the fact sheet information, each student will then write three trivia questions (on the blank trivia cards) that the other students will have to answer about the wilderness.

4. Have the teams re-form and tell them their team will use the information they have learned to play Wilderness Trivia. Each team member should select one question from those written in the jigsaw groups to add to the pile of cards their team is dealt. Then give the students the Wilderness Trivia Game rules to read.

5. Combine two teams, and ask for one volunteer from each team. One volunteer will shuffle the printed trivia cards and the other will deal each team twelve (12) cards face down, and place the remaining cards aside. Teams should now shuffle

their four additional questions into their pile of trivia cards. Teams and participants within each team take turns asking questions of the other team. Teams are allowed twenty seconds to confer before giving an answer, but only one answer may be given by one designated speaker. When a team answers correctly, it keeps the card. When an incorrect answer is given, the correct answer should be read and the card placed in the discard pile. Words in parentheses provide extra information and are not necessary for an answer to be correct. Play continues until both teams use all sixteen cards. The team with the most cards wins this round of Wilderness Trivia. (Should your class have an odd number of teams, three teams can play with eight cards each from the provided cards plus four questions they have written.)

Play again with the remaining cards, discarded cards, and other questions the students have written.

Procedure:

Part 2:

1. Remind the students of what they learned from the wilderness trivia game; the importance of protecting Wilderness, the key players in promoting Wilderness protection, the contents of the Wilderness Act, and how Wilderness lands are managed. In the next part of "Citizen Action" the students are going to tackle environmental concerns that they have about their local area and develop action plans.

2. Have students brainstorm a list of environmental questions, issues, and concerns they have about their classroom, school, community, county (or parish), and state, and write these on the board. (Questions might include: How could we use less paper in our classroom? Why is nothing growing on our school grounds? Could we make a nature trail on our school campus? Why is the stream that runs through our community polluted? Does our county (parish) or state have any natural areas, and if so, how can we visit and learn more about them?)

3. Ask teams of four to select one question, issue or concern they want to try to solve. (It's okay if one topic is selected by more than one team. Individuals will take responsibility for team discussions if each team member is given one part of the Local Concerns Action Plan to complete. (For teams with five members, two students should work on the How part.)

4. Team presentations. After the teams are satisfied with their action plans, they should prepare to present their solutions to the entire class, making sure each team member has an opportunity to participate. Presentations, posters, learning centers, and skits are preferred to lecture presentations.

5. If several teams were working on separate issues, have the class vote on the

one they would most like to solve first. Working together as a class may simplify the efforts (keep track of the other plans so the students can attempt to solve these later). Help the class take action by working with them to identify specific assignments and develop a time line. Provide class time for their action project.

6. Ask the following questions:

- Why protect wilderness lands: Who wanted wilderness protected? What is the Wilderness Act? How are our wilderness lands cared for?
- What can you do for wilderness?
- How can you and your classmates solve problems in your community?

Extensions:

- Encourage students to write additional wilderness questions after further study of information on The National Wilderness Preservation System poster.
- Find out more about the federal lands we all own, not just those designated wilderness. Invite speakers to explain the multiple roles of the United States Forest Service, the National Park Service, the Fish and Wildlife Service, and the Bureau of Land Management.
- Learn about the path a bill must take to become a law in the United States.
- Have students develop a trivia game for other subjects tied to land use, by studying information and writing their own questions.

Evaluation / follow-up / Extension:

- Divide students into small groups. Provide a copy of the Time-line for Management of Public Lands (BACKGROUND) page to each group. Ask them to create a historic timeline of wilderness preservation on newsprint complete with illustrations and artwork.
- Evaluate students on successful completion of the trivia game and student projects in Activity 2.

Career Options:

nature writer, artist, historian, policy maker, Wilderness manager, Wilderness ranger, Wilderness activist, photographer.

References:

- The Green Scene, "Citizen Action: The Wilderness Act."
- U.S. Forest Service, "Investigating Your Environment, Wilderness."
- U.S. Forest Service Backcountry Skills and No-trace Camping

Wilderness Act Fact Sheet

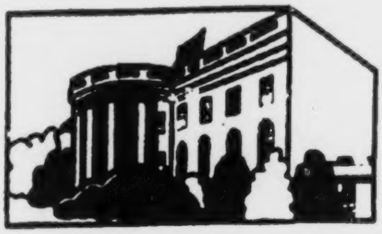
This information should help you answer: *WHAT* is the Wilderness Act?

In the Wilderness Act, Wilderness is defined as an area "where the Earth and its community of life are untrammeled by man, where man himself is a visitor that does not remain." Wilderness areas are special places where nature comes first. This Act created the National Wilderness Preservation System where road building, structures, timber cutting, cars and other motorized equipment are not allowed.

The first bills to protect some of the nation's wild lands were introduced in Congress in 1956. Senator Hubert Humphrey of Minnesota sponsored the Senate bill, and Congressman John Saylor of Pennsylvania sponsored the bill in the House of Representatives. These bills were debated for eight years and rewritten 66 times. In all, 18 hearings were held for people to debate the merits of a National Wilderness Preservation System.

The final vote in the Senate was 73 in favor and 12 against (the other fifteen senators either abstained or were absent). In the House of Representatives, however, the vote was 373 to 1. The United States was the first nation in the world to pass a law to protect wild lands.

When President Johnson signed the Wilderness Act, about 9 million acres of road-free land in our National Forests were protected. The Act also said that the federal government should continue to study its lands and make recommendations on future inclusions in the Preservation System.



DIRECTIONS:

Write three trivia questions from the information you have been given on this fact sheet. Copy each question on a blank Trivia Card.

This information should help you answer: *WHY* protect wilderness lands?

Wilderness Fact Sheet

Once North America was all Wilderness. With time, however, there were fewer natural places and more and more land developed for houses or work sites. Some people began to worry that one day there would be no Wilderness left.

The United States passed a law in 1964, called the Wilderness Act, to protect some wild land forever. These Wilderness areas are important as places for wildlife, sources of clean air and water, recreation, and new scientific discoveries.

Wildlife Wilderness provides homes for many kinds of wildlife, some threatened by extinction. Millions of birds use Wilderness lands as nesting and wintering grounds and resting places when migrating. Many different species including wolves, bears, moose, elk, dall sheep, and antelope make their homes in Wilderness. Without this protected land many of these animals could not survive. They need space to thrive.

Clean water and air Wilderness is good for the environment. Wilderness areas protect watersheds and provide pure water for cities and rural areas. They help keep the air clean because the trees and plants within them absorb carbon dioxide and produce oxygen.

Recreation People need Wilderness, too. Wilderness areas are scenic places where people can go to escape from crowds, cars, and the noise of machines. They are places to have fun where you can hike, camp, picnic, canoe, fish, ski, ride horses, watch wildlife, take photographs, paint pictures, climb mountains, or enjoy some time alone.

New scientific discoveries Wilderness areas contain many plants and animals that may be helpful for scientific or medicinal purposes. Scientists have studied only about five percent of the plants in the world today for their possible helpful effects on humans.

DIRECTIONS:

Write three trivia questions from the information you have been given on this fact sheet.
Copy each question on a blank Trivia Card.

This information should help you answer: *WHO* wanted wilderness protected?

Many people have worked to protect some of the natural lands of the United States as Wilderness. Some of the first people to argue that the nation should save some of its remaining wild areas were writers and artists. Writers such as Henry David Thoreau, John Muir, Ralph Waldo Emerson, and Walt Whitman spoke beautifully of the value of wild places. Painters like Albert Bierstadt, George Caitlin, and Thomas Moran captured the beauty of wilderness on canvas. They helped many people see the value of preserving wilderness.

In 1935, The Wilderness Society was founded by eight people who wanted "to fight for the freedom of wilderness." Two of the founders were Aldo Leopold and Bob Marshall, both professional foresters. (A 1.2 million acre Wilderness area in Montana is named after Marshall.) Almost thirty years after its beginning, the Wilderness Society was instrumental in the passage of the Wilderness Act, which was written by Howard Zahniser, the Society's executive director. This organization continues to be active in lobbying for additions to our wilderness systems.

When visiting Wilderness, minimize your impact on the environment. Remember that Wilderness is managed for preservation and follow the rules set up by the land managers. It is important to camp, wash, brush your teeth, and place human waste at least 200 feet away from water sources. All trash should be carried out—even the litter left by someone else. Respect others' desire for quiet and leave radios and loud voices at home.

DIRECTIONS:

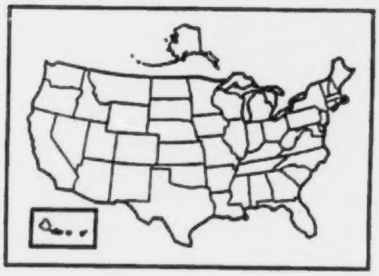
Write three trivia questions from the information you have been given on this fact sheet.
Copy each question on a blank Trivia Card.

This information should help you answer:
HOW are our wilderness lands cared for?

The National Wilderness Preservation system was created by Congress in 1964 when it passed the Wilderness Act. At that time the system included 54 national forest Wilderness areas in 13 states for a total of 9.1 million acres. Only three areas were in the eastern United States: one in New Hampshire and two in North Carolina. The rest were in the states of Arizona, California, Colorado, Idaho, Minnesota, Montana, Nevada, New Mexico, Oregon, Washington, and Wyoming.

The United States Forest Service was the first federal agency to protect Wilderness. In 1924, forty years before the Wilderness Act was signed, forester Aldo Leopard convinced the Forest Service to set aside half a million acres in the Gila (pronounced hee-la) National Forest in New Mexico and preserve it as Wilderness. The Gila Wilderness became the first protected Wilderness area in America.

Wilderness lands are now managed either by the United States Forest Service (USFS), the National Park Service (NPS), the Fish and Wildlife Service (FWS), and the Bureau of Land Management (BLM). Today there are 603 wilderness areas totalling 104 million acres. The National Park Service takes care of the greatest number of acres (38.5 million), followed closely by the Forest Service (33.2 million acres).



Now there are Wilderness areas in all states but six; Rhode Island, Connecticut, Delaware, Maryland, Kansas and Iowa. Most of the nation's Wilderness (57 million acres) is in Alaska. The largest Wilderness, 8.7 million acres, is in the Wrangell - St. Elias National Park in Alaska. The smallest Wilderness, just six acres, is the Pelican Island National Wildlife Refuge in Florida.

Look at the map of The National Wilderness Preservation System to determine how many wilderness areas exist in your state and how many acres are wilderness.

NUMBER OF WILDERNESS AREAS: _______

TOTAL NUMBER OF ACRES IN OUR STATE: ______acres

DIRECTIONS:
Write three trivia questions from the information you have been given from this fact sheet. Copy each question on a blank Trivia Card.

GREEN

CITIZEN ACTION

1

WILDERNESS TRIVIA GAME RULES

Have a person from one team shuffle the trivia cards and one person from the other team deal each team 12 cards face down. Place additional cards in the discard pile.

Teams should now add their four additional questions to the pile of trivia cards.

Teams should take turns asking questions of the other team. Also take turns with different readers from each team. Teams are allowed twenty seconds to confer before giving an answer but only one answer may be given by one speaker. When a team answers correctly, it keeps the card. When an incorrect answer is given, the correct answer should be read and the card placed in the discard pile.

Play continues until both teams use all sixteen cards. The team with the most cards wins.

Play again with the remaining cards, discarded cards, and other questions you have written.

©1990

$ Cut along dotted lines

Q True or false: It is okay to dump soapy water into a Wilderness stream.

A False. (In fact, you shouldn't dump soapy water into any stream.

Q People are not allowed to sleep in Wilderness areas.

A False (Camping is a popular activity in wilderness areas.)

Q Where is the Wilderness area named after Bob Marshall?

A Montana

Q How many Wilderness areas are there?

A 603

Q Name an organization you could join to help protect more wilderness areas and wildlife habitat.

A Any of the following or others acceptable to the team: The Wilderness Society, National Wildlife Federation, Sierra Club, and National Audubon Society.

Q How many public hearings were held before the Wilderness Act was passed?

A 18

Q Is it okay to bury trash in a Wilderness area?

A No. (All trash should be carried out.)

Q What is the largest Wilderness area?

A Wrangell-St Elias
(an 8.7 million-acre national park in Alaska)

GREEN

CITIZEN ACTION

2

©1990

$ **Cut along dotted lines**

Q In what National Forest was the first Wilderness area?

A Gila National Forest (in New Mexico).

Q In what year was the Wilderness Act passed?

A 1964

Q Can trees be cut for lumber in U.S. Forest Service Wilderness area?

A No. (Forests on some U. S. Forest Service lands are cut and used for lumber but never on wilderness lands.)

Q What president signed the Wilderness Act?

A Lyndon Johnson (36th president of the United States (1963-69)

Q How many acres are in the Wilderness system today?

A 104 million acres.

Q How many acres were in the Wilderness system when it was first created?

A About 9 million acres.

Q Give a reason for preserving Wilderness.

A One from this list or other answers acceptable to the team: wildlife, clean air and water, recreation, or new scientific information

---

Q Name a state that has no Wilderness areas.

A One from this list: Connecticut, Delaware, Iowa, Kansas, Maryland and Rhode Island.

Q When were the first bills to protect wild lands introduced in the U.S. Congress?

A 1956

Q Who introduced the first Wilderness bill in the United States Senate?

A Hubert Humphrey (a Democratic senator from Minnesota who later became vice president of the United States and ran unsuccessfully for president in 1968).

Q Who first introduced the Wilderness bill in the United States House of Representatives?

A John Saylor (a Republican congressman from Pennsylvania).

Q How many years did it take the United States Congress to pass the Wilderness Act?

A Eight years.

GREEN

CITIZEN ACTION

3

Q Name a writer who loved wilderness.

A Any of the following or others that are acceptable to the team: Henry David Thoreau, John Muir, Ralph Waldo Emerson, Walt Whitman.

Q Name an artist who loved wilderness.

A Any of the following or others that are acceptable to the team: Albert Bierstadt, George Caitlin, Thomas Moran.

©1990

$ Cut along dotted lines

Q How many times was the Wilderness Act rewritten before it was passed?

A 66

Q Name a government agency that takes care of Wilderness areas.

A Any one of the following: United States Forest Service, Bureau of Land Management, Fish and Wildlife Service, and National Park Service.

Q When was The Wilderness Society formed?

A 1935

Q Which state has the most Wilderness?

A Alaska (more than fifty-five million acres or two-thirds of all our wilderness lands are in Alaska.)

Q What is the smallest Wilderness area?

A Pelican Island (a six-acre national wildlife refuge in Florida).

Q Which federal agency was the first to set aside Wilderness areas?

A United States Forest Service (in 1924).

Q Name something that is not allowed in a Wilderness area.

A Any of the following: timber cutting, road building, houses or other buildings, cars or other motorized vehicles.

Q What was the final U. S. Senate vote on the Wilderness Act?

A The U.S. Senate vote was 73 in favor and 12 against (the other fifteen senators either abstained or were absent).

Q Who wrote the Wilderness Act?

A Howard Zahniser (then executive director of The Wilderness Society).

Q What was the final U.S. House of Representatives vote on the Wilderness Act?

A 373 in favor and 1 against.

GREEN

CITIZEN ACTION

4

©1990 $ Cut along dotted lines

Q Which federal agency manages the greatest number of Wilderness acres?

A The National Park Service

Q What percent of the world's plants have been studied so far for their beneficial uses?

A Only about five percent (5%)

Q When the Wilderness system was created only two eastern states had Wilderness areas. Name them.

A North Carolina and New Hampshire

Q What is Wilderness?

A A natural place where people do not live

Q Name one reason Wilderness lands are important to birds.

A Any one of the following: food, nesting and wintering grounds, homes, resting places when migrating, or other

Q Name two animals that need wild places to thrive.

A Any two of the following: wolves, bears, moose, elk, dall sheep, antelope, or other answers acceptable to the teams.

Q For how many years has the United States had the National Wilderness Preservation System?

A _____(current year) minus 1964 (the year the Wilderness Act was signed) equals the number of years.

Q How do Wilderness areas help clean the air?

A The plants within them produce oxygen and absorb carbon dioxide.

Q Name two things you can do in Wilderness.

A Any two of the following plus others acceptable to the team: hike, camp, picnic, canoe, fish, ski, ride horses, watch wildlife, take photographs, paint pictures, climb mountains and enjoy time alone.

Q Are cars allowed in the Wilderness?

A No (motorized vehicles are allowed only by special authorization).

Q True or false: You are allowed to fish in Wilderness.

A True. (The Wilderness Act permits fishing and hunting, but the National Park Service does not allow hunting on the lands they manage.)

Q What was the first country to save Wilderness?

A The United States

GREEN

CITIZEN ACTION

BLANK
TRIVIA
CARDS

Q
A

Q
A

©1990

$ Cut along dotted lines

Q
A

Q
A

Q
A

Q
A

Q
A

Q
A

Q
A

Q
A

Q
A

Q
A

LOCAL CONCERNS ACTION PLAN

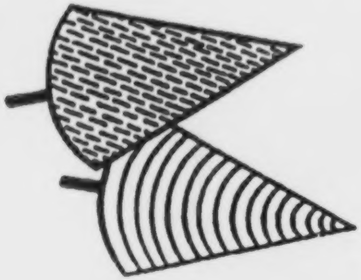
LOCAL CONCERNS ACTION PLAN

©1990

$ Cut along dotted lines

CITIZEN ACTION

GREEN



BEST COPY AVAILABLE

LESSON 2 • **Environmental Policy History**

Objectives:
Students will:

- study and analyze the concepts of "preservation" and "conservation" related to Wilderness and other public lands.
- demonstrate an understanding of the contributions of Gifford Pinchot and John Muir.
- develop a historical time-line to portray significant people and events of the conservation movement.

Background:
Environmental policies are the basis for clean air we breathe and pure water we drink. We still have diversity in flora and fauna due to legislation like the Endangered Species Act and the Clean Water Act. And we have areas protected and managed as Wilderness thanks to the value the American public and conservation leaders at the turn of the century placed on the rapid disappearance of wild places. This lesson enables students to study key players in the conservation movement, the hard fought personal and professional battles, and the resulting environmental policies we honor today.

Activity 1, the one-hour video, "The American Experience: Battle for Wilderness," provides excellent historical film footage and interpretation of the conservation movement. It portrays the lives of two of the most influential people in the development of the National Wilderness Preservation System (NWPS), Gifford Pinchot and John Muir. The video includes coverage of the Hetch-Hetchy controversy and the conservation movement. Rod Nash and Wallace Stegner give their views along with historians giving an account of the development of the Forest Service, National Park Service, the NWPS, and the role of President Theodore Roosevelt. This video paints a thorough picture of the individuals involved in the movement to protect Wilderness and the ensuing battles they fought. It gives a solid basis for understanding where we are today, how far we have come and the importance of protecting Wilderness. In Activity 2, "Muir and Pinchot Today," students will project what viewpoint both Muir and Pinchot would take today on important conservation issues and Wilderness management dilemmas. During this activity students will discover the differences and similarities of the concepts of "preservation" and "conservation" in both a historical and contemporary application. In Activity 3, "Wilderness Timeline," students will select a date from the timeline, conduct research on other historical events of the time, and translate how these events affect Wilderness.

Activity 1: The American Experience: Battle for Wilderness

Materials:

- video: *The American Experience: Battle for Wilderness*
- teacher handout discussion questions: "The American Experience: Battle for Wilderness," pages 225-228.
- pen
- paper or journal

Duration: 1 hour for the video showing, possible homework

Location: classroom

Procedure:

1. View the video "The American Experience: Battle for Wilderness" with your students. You may want to break the video into several sessions.
2. Assign or discuss "Battle for Wilderness" discussion questions, pages 225-228.

Activity 2: Muir and Pinchot Today

Materials:

- pen and paper or journal
- research materials and resources

Duration: 45 minutes - 1 hour

Location: Classroom

Procedure:

1. Have students divide into two groups, one that represents the views of John Muir and one that represents the views of Gifford Pinchot. If smaller groups are desired, have more than one group represent the viewpoints; this will be good for discussion purposes. Have groups select a note taker and a group leader.
2. Ask the students to consider their person's views in today's world. Have them discuss, in general terms, if one view or the other exists in today's world. Think of public land agencies, of public land designation—National Parks, National Forests. Have these two viewpoints come closer together or farther apart. How and Why?
3. Pose the following scenario: A bill is in Congress that will require a fee for recreationists to visit Wilderness areas across the country. What position might John Muir and Gifford Pinchot take on this bill?

Procedure continued:

4. Pose the following scenario: an endangered wildlife species, the wolverine, is being reintroduced into some Wilderness areas across the country. In order to protect the species human visitation will be limited for five years. What would Pinchot and Muir say to this?

5. Bring students together for a group discussion. Go through the above discussion questions and have the groups state their perspective of how Muir and Pinchot would respond in today's world and would their views be relevant today.

Discussion guidelines for teachers:
This activity is intended to bring out the changed political landscape. Consider that the times and the life-styles of the American public have changed. During the discussion have students try to find commonality between the two viewpoints that are often considered opposite. This can and should lead to ideas of consensus, compromise and lead to win-win situations instead of win-lose. Try to lead students towards the commonality of Muir and Pinchot in today's political environment.

Activity 3: Wilderness Timeline

Materials:

- "Wilderness—A Brief History" from "Wilderness: An Overview" section of the curriculum, pages 9-11.

Duration: 1 class period

Location: Classroom

Procedure:
1. Have students view the timeline from "Wilderness—A Brief History."
2. Cut one copy of the timeline into separate pieces so everyone has at least one date.
3. From the timeline have students take home or spend some time during class conducting research for the following activity.
4. Have students report on at least one other event that took place that year or in the years proceeding that year in American history. Is there any connection to the event in Wilderness history? Was there a war going on? Was it a prosperous time? What other environmental legislation took place at the same time? Sometimes a connection or the context of the event provides insight into America's culture or values at that time.

Evaluation / Follow-up / Extension

- Evaluate individual or group assignments.
- Have students write a one page paper on an event in the timeline and its connection to other events in American history.

Procedure continued:

- Encourage students to conduct further reading and study of people and organizations involved in the conservation movement.

Career Options: historian, policy maker, environmental advocate, Wilderness manager

References:

- *Mountains Without Handrails, Reflections on the National Parks,* Joseph L. Sax
- *The American Conservation Movement,* Stephen Fox
- *Our Common Lands, Defending National Parks,* Edited by David J. Simon
- *Wilderness and the American Mind*, Roderick Nash

Activity 1: The American Experience: Battle for Wilderness
TEACHER HANDOUT • **Discussion Questions**

1. Name the first organized groups who used wilderness in the early 1900's.

   Response: Audubon, Sierra Club, Boy Scouts, Campfire Girls

2. Describe the key points of the Progressive Era.

   Response:

   - child labor reform
   - giving women the right to vote
   - the breakup of monopolies
   - guarantee of pure food on the table

3. What significant events changed John Muir's life?

   Response:

   An industrial accident temporarily blinded him. He was on the edge of becoming a rich man but gave it up for a life of wandering in the wilderness. He took a 1,000-mile journey to the Gulf of Mexico at age 29. A crucial revelation he has as a result is that the natural world is not made for him but is none the less beautiful, self-consistent, and useful unto itself. As time passed, Muir spent more and more time in the mountains, becoming totally absorbed by his experience in that place, at that time. People thought he was "strange" since he thought trees and bears were more important than humans. He taught the American society we can go into the wilderness and not fear it. He became a self-taught scientist and wrote numerous articles and essays for newspapers and magazines about the natural world. He helped create Yosemite National Park and was the founder of the Sierra Club.

4. In contrast to John Muir's upbringing, describe how Gifford Pinchot was raised? How did his childhood experiences help form his passion for the land?

   Response:

   Pinchot was raised in an elite, wealthy family. He traveled through Europe as a child, went to the best schools, and was raised to be a powerful man. His father chose forestry as a career for Gifford Pinchot. While attending forestry school in Europe, he was alarmed with the deforestation of France and believed that America could run out of trees. He realized the industrial era had given the public the idea that our resources were limitless and the result of this movement produced vanishing forests that were over logged and overgrazed, and ruined by mining wastes. He became the first American forester. His central belief was that scientific forestry, the controlled planting and cutting of trees would protect our dwindling forests and prove profitable to the American people.

Activity 1: The American Experience: Battle for Wilderness

TEACHER HANDOUT • **Discussion Questions**

continued:

5. Explain why the controversy over damming Hetch Hetchy valley was described as "a spiritual watershed in American history".

   Possible response: Answers may vary.

6. What was the common thread held between John Muir and Gifford Pinchot?

   Response: They both strongly believed that it was imperative to save American forests from wholesale destruction. They are known as the "Fathers of the American Conservation Movement." How the American forests should be saved was their major point of difference and dissension. Muir believed that "It (wilderness) was as God made it...perfect." Pinchot, in contrast, believed that "The Earth belongs to all...the public good must come first." The landscape could be improved if humans could manage it.

7. Describe the first major disagreement between Muir and Pinchot regarding land management.

   Response:

   Sheep, or "hoofed locusts," as Muir called them, were the subject of disagreement. In the press, Pinchot recommended grazing on public land. Pinchot had a multiple use land management mission. He thought you could have forestry, grazing, watershed protection, hunting, and fishing all in the same place. Muir disagreed. He felt you couldn't have both multiple use and Wilderness.

8. Describe other cultural effects of Wilderness on people in America.

   Possible response:

   With the frontier coming to an end in 1890, people were searching for an identity. What was the character of our culture becoming? Wilderness became an invention of the "post-Indian world." This concept of wilderness erased the role of Native Americans from the landscape. Wilderness was thought of as an area devoid of human occupation. Both Muir and Pinchot left out the poor who had little access to wilderness. Wilderness was enjoyed and revered by the wealthy, privileged classes. During this time, Theodore Roosevelt created the Boone and Crockett Club who catered to white, wealthy men from back east who would travel to the western wilderness to hunt and camp. During this era President Roosevelt also crated numerous national parks, monuments and reserves. He named Gifford Pinchot as his Director of the Bureau of Forestry who later became the first chief of the Forest Service and championed the idea of a national forest system.

9. What was the motivation behind the origins of the "Conservation Movement"?

   Possible response: When Europeans settled in North America they thought resources like trees were without limit and theirs for the taking. By 1890 the frontier had come to an end, and the industrial movement had an ever increasing appetite for our natural resources.

Activity 1: The American Experience: Battle for Wilderness

TEACHER HANDOUT • **Discussion Questions**

continued:

John Muir led a movement to "save what was still unspoiled, before it was too late; not just for the sake of wilderness, but for the good of our souls. By 1900, people began to believe that Wilderness was worth protecting and this idea started a national movement. People were nostalgic for a simpler, more primitive experience.

10. Describe the hardships of John Muir's upbringing. Explain how you think these childhood experiences helped form his passion for Wilderness.

Possible response: Muir was born to a family who immigrated from Scotland to Wisconsin in 1849 to homestead on the frontier. He worked from 4 a.m. to 9 p.m., 17 hours of hard labor daily. There was little joy in his household due to his father's strict practices of Calvinism. He would have to make his own way. As a young man he developed inventions and later worked in factories located in large cities. He was not happy with his civilized life. Answers may vary on how students think Muir's childhood experiences led to his crusade for Wilderness.

11. Why is the story of Hetch Hetchy significant to the conservation vs. preservation controversy?

Possible response:

After a major earthquake struck San Francisco, threatening its public water supply, there was a move to dam and flood the Hetch Hetch valley. The Hetch Hetchy valley was located within the boundaries of Yosemite National Park. The controversy between Muir and Pinchot was: What is the role of National Park Service lands? This became a national controversy. Muir and his followers believed if this National Park was opened to development, other parks were also in danger. Pinchot became an advocate of the dam because it was a good example of multiple use management. It would break up a powerful, private water monopoly in San Francisco and return water issues to public control.

Muir used the media for an impassioned plea to the American public to save Hetch Hetchy valley. He wrote editorials, essays, and produced photographs showing the potential damage to the valley. He used Pinchot as an example of someone to blame for the ruination of magnificent country. He roused the American public to lobby Congress, and gained support for preservation from all the major newspapers in the country. Pinchot used Muir as an example of a Wilderness fanatic. To industry, he seemed reasonable in his conservation crusade. He used his political power to lobby Congress and effectively convinced Roosevelt to support the dam project. Pinchot spoke of the "greatest good for the greatest number of people."

After 8 congressional hearings which lasted over a decade, the Senate approved the project in 1913.

Activity 1: The American Experience: Battle for wilderness

TEACHER HANDOUT • Discussion Questions

continued:

12. Explain the statement, "Muir lost the battle to save Hetch Hetchy valley, but he alsowon".

Possible response:

Since the damming of Hetch Hetchy valley, no comparable intrusion in the national parks has occurred. Recently, a move to develop potential gas and oil reserves at Arctic National Wildlife Refuge in Alaska has taken main stage as a comparable conservation battle. In 1916 Congress passed the National Park Service Act. John Muir left a legacy of resources untouched, the national park system. Muir is recognized as the founder of the idea of Wilderness, but Pinchot was largely responsible for preserving Wilderness since Pinchot set aside much of the land that has became the basis of the National Wilderness Preservation System.

13. Explain how Wilderness has become part of our American culture.

Possible response: Answers may vary. Main points to cover: Wilderness has always been a part of our culture since the arrival of the Mayflower. By 1900, 90 percent of forests were cut down or burned. Like many early pioneer families, the Stegner family felt people were greedy because we were motivated by the idea that our natural resources were unlimited, we'd never run out.

14. The video portrays an either/or question between Muir and Pinchot in the Conservation Movement. What values and ideas from both Muir and Pinchot should guide the Conservation Movement for future generations?

Possible response: Answers may vary.

LESSON 3 • **Historical Photographs**

Objectives:
Students will:
- examine historical photographs and images portraying Wilderness and wild places.
- develop appreciation for the historical and cultural significance of Wilderness.
- create stories to describe images presented in photographs.

Duration: 1 to 2 class periods

Location: classroom

Background:
Historical photographs have captured many images of Wilderness from the aesthetic images of Yosemite National Park captured by Ansel Adams to photographs taken by land management agencies showing the manual labor of trail building and horsepacking. It is through these images that we are able to travel back in time to examine the wilderness idea seen by people living in the 19th century.

The video, "Wilderness: An Act of Contrition", combines music, memorable quotes and beautiful images to give a chronological account of the Wilderness movement. It is a powerful video of images that tell the historical wilderness story with an artistic style. Students will review the video and historical photographs and examine why certain images were used to portray the Wilderness movement.

Activity 1: A Wild Image Frozen in Time

Materials:
- historical photographs
- video: *Wilderness: An Act of Contrition*

Suggested Reference Materials:
- books: *The First 75 Years, National Park Service, Centennial Mini-Histories of the Forest Service, The First Ranger—Adventures of a Pioneer Forest Ranger, Public Lands, Public Heritage, The National Forest Idea,* and *Ansel Adams Photography*

Procedure:

1. Introduce the lesson by showing the video. Discuss the images presented in the video. Ask students to describe impressions the images made on them. How were these images used to portray the historical account of the Wilderness movement?

2. Break students into small groups and distribute copies of wilderness photographs, or have students examine historical photographs in books recommended in the materials section. Ask each group to examine photographs and be prepared to:
   - compile ten adjectives to describe the images.
   - explain the connection between the images and Wilderness.
   - select one photograph to develop story ideas about what you think the photographer is trying to convey.

3. After each group has shared their impressions, ask individual students to each select a photograph to write a story about. Use the discussion questions from the small group activity to serve as inspiration.

4. Display stories and photographs in a public place.

Evaluation / Follow-up / Extension:

- Evaluate group presentations and writing assignment.
- Assign students to capture images of Wilderness in photographs. This assignment can vary in depth from reviewing popular outdoor magazines to creating a portfolio of photographs they have taken describing personal definitions of Wilderness.
- Conduct historical research on the life and work of Ansel Adams, or others.

Career Options: historian, photographer, photo journalist, artist

References:

- *The First 75 Years, National Park Service*
- *Ideas For Wilderness Information and Education, U.S. Forest Service*
- *Centennial Mini-Histories of the Forest Service, U.S. Forest Service*
- *The First Ranger-Adventures of a Pioneer Forest Ranger, C.W. Guthrie*
- *Public Lands, Public Heritage, The National Forest Idea, Alfred Runte*
- *Ansel Adams Photography*

LESSON 4 • **Traditional Tools**

Objectives:
Students will:
- identify hand tools and their uses for trail work in Wilderness.

Duration: 1 class period with possible additional field trip

Location: indoors or outdoors

Background:
People and animals have been using primitive tools since the beginning of time. Sea otters use rocks to help them open clam shells. Chimpanzees, apes, and gorillas all use primitive tools for food gathering, eating, shelter, and defense. Ancient history suggests that our ancestors used these same tools for similar functions. As time progresses, we have invented modern tools which make our jobs faster and easier to perform. According to the Wilderness Act, work projects will be performed with minimum tools whenever possible. Even though it may take longer, and is more physically demanding, the use of traditional tools is part of our cultural heritage which we must preserve. Wilderness provides a place in contrast to our fast-paced modern world, where we can slow down and reflect on where we've come from. Using traditional hand tools in Wilderness is one way we can keep in touch with our cultural heritage.

Trail work in Wilderness requires many kinds of hand tools like saws, axes, picks, hammers, shovels and grub hoes. To be safe and productive, trail workers must know how to select the best tools for the job, use them skillfully, and maintain them correctly. However, modern technology has caused a gap in our hand tool knowledge. Most trail tools have become uncommon in our everyday work world. This lesson will provide historical photographs, illustrations, and explanations of some of the more common trail tools used in Wildernesses today. Students will learn about different trail tools used to perform work projects in Wilderness.

Activity 1: Traditional Tools

Materials:
- *Handtools for Trail Work*, US Forest Service

Procedure:
1. Provide background information to students on the cultural significance of hand tools in Wilderness.

2. Set up a bulletin board display of hand tool cards or pass individual cards around to students to examine. Ask students to try to identify tools and their functions before sharing information on backside of cards. Do students have friends or relatives (like grandparents) who once used hand tools?

Procedure continued:

3. Discuss why hand tools (instead of motorized tools) are used in Wilderness whenever possible.

4. If possible, invite people from a natural resource agency like the Forest Service, Bureau of Land Management, National Park Service, or Fish & Wildlife Service or personnel from a local historical society or museum into your classroom to demonstrate the use of these tools. Another option is to ask students to invite their grandparents or an elder they know who is familiar with these hand tools.

5. Take a field trip to one of these agencies or a museum where they have traditional hand tools on display. Make arrangements for personnel from the agency to give a demonstration and allow for students to actually use the tools.

Evaluation / Follow-up / Extension

- Set up a lab activity with hand tool cards where students will view photographs or illustrations listing hand tool, name, and function.
- Assign students to write a creative essay describing how they would perform a modern day job using only traditional hand tools.
- Contact a natural resource agency and arrange to adopt a trail where students can perform physical labor and gain experience using traditional hand tools.

Career Options:

laborer, trail crew worker, landscape architect, historian

References:

- "Hand tools for Trail Work," U.S. Forest Service

AMERICAN HISTORY
Communication Arts; Research

Lesson 5 • **Minimum Tools**

Objectives:
Students will:

- define the minimum tool concept
- identify traditional or primitive tools
- understand how the **Minimum Tool Concept** is applied in Wilderness.

Background:
With a few exceptions, the Wilderness Act prohibits temporary roads, motor vehicle use, motorized equipment and mechanical transport in Wilderness areas. The Minimum Tool concept has often been defined as using a traditional or primitive tool such as a crosscut saw, shovel or ax to clear downed trees from trails. Trail crews use these traditional tools in their work. It takes a lot of skill, sweat, and hard work to safely operate these tools. Agencies like the Forest Service, who have management responsibilities in Wilderness, must make sure that the projects they are doing are needed to protect the physical, social, and biological resources. The minimum tool concept can be used to evaluate trail or bridge construction and maintenance projects, fire suppression activities and safety of the project workers. A “Minimum Tool Kit” contains more than physical tools. It will also include minimum impact camping techniques. The use of porta potties and the packing out of human waste is another example of the minimum tool concept for boaters along the river corridors in Wildernesses.

We live in a society where “more is better” and we depend on technology to provide us with tools and machinery that will make the job cheaper, faster and easier. Using the “Minimum Tool” concept may mean using horses and mules to transport a large garbage cache out of the Wilderness instead of a helicopter. The helicopter may be faster and will require fewer trips than the pack animals, but we should not depend on motorized equipment to get the job done in Wilderness. In Wilderness, managers don't always pick the quickest, most convenient choice. Remember, Wilderness is set aside as an area in contrast with those areas where people and their works dominate the landscape.

According to Laurie Matthews, a Wilderness manager on the Frank Church-River of No Return Wilderness in Idaho, “A tool is a means to an end; something that we devise and use to help us accomplish our work. In Wilderness we sometimes use tools to overcome the resistance of nature as we maintain and clear trails. We use hand tools in the Wilderness to saw, chop, grub, dig, tamp, pound, write, measure, hammer, drill, lift, haul, peel, shape, and sharpen. But a tool is not just a means to an end. A tool can also be a vehicle to experience and understand the relationship between self and nature.”

Students will be introduced to the concept of Minimum Tools in Wilderness and read about projects in the Frank Church-River of No Return Wilderness where Wilderness managers had to decide which minimum tools were necessary to get a job done with the least physical and biological impacts to Wilderness. Students will then be asked to analyze the projects and decide if the most appropriate minimum tools were used.

AMERICAN HISTORY
Communication Arts; Research

Activity 1: Minimum Tools

Duration: One to two class periods

Location: Indoors or outdoors

Materials:

- Articles from *Frankly Speaking, The Minimum Tool* newsletter: "Minimum Tool Decisions Can Be Tough", "Pondering the Paradox", "Airstrip Project Revives Draft Horse Skills", "Sometimes A Motor Is the Minimum Tool", "Edna Mule-Minimum Tool" and "High Tech Provides Low Impact Tools," pages 236-240
- Student Handout: "Minimum Tool Concept Discussion Questions," page 235

Procedure:
1. Introduce the concept of minimum tools in Wilderness after reading the background section of this lesson, page 233.
2. Assign individual reading assignment, "Minimum Tool Decisions Can Be Tough" to familiarize students with the challenges facing Wilderness managers in getting their work projects done.
3. In small groups, assign one of the other four articles to each group. Each group will read, discuss their case study, complete the discussion questions, and prepare to share their case study with the rest of the class.

Evaluation/Follow-up/Extension:

- Ask students to define the "Minimum Tool Concept". Discuss why so much emphasis is placed on using hand tools vs. motorized tools in Wilderness. Do they agree or disagree? Encourage students to defend their point of view while respecting differing viewpoints.
- Each student can describe a chore or task they perform at home. What kind of tools do they use to perform the job? Could the job be done with non-motorized tools? How would the use of hand tools affect getting the job done?
- Invite a guest speaker to display and explain how traditional or primitive tools are used.

Career Options:

Wilderness manager, trail crew leader or worker, Wilderness ranger, laborer, horse & mule packer

References:

Frankly Speaking, Biannual Report of the Frank Church-River of No Return Wilderness/Winter 1993-94.

Activity 1: Minimum Tools

STUDENT HANDOUT

Minimum Tool Concept Discussion Questions

Read the article from *Frankly Speaking*. Answer the following questions:

1. Describe the Wilderness project.
2. What tools were used to complete the Wilderness project?
3. Why were these tools selected?
4. Do you agree or disagree with the choice of tools selected to do the job? Why?
5. If you were a Wilderness manager, describe another idea or strategy you would use besides the tools and techniques actually used to complete the job.

Minimum Tool

Pondering The Paradox

Editor's note: When I asked the Krassel Ranger District Wilderness folks to talk about their award winning Yellowjacket Mine clean up project, it led to a discussion which points out the questions and paradoxes that arise in making minimum tool decisions.

The Krassel Ranger District was the proud recipient of both our Regional and National Primitive Skills and Minimum Tool Awards in 1993. The project was described in the last edition of *Frankly Speaking*, and at this point has turned into an endless series of pack strings moving back and forth between the Yellowjacket rehabilitation site and the road end at Big Creek. One day we will be able to pack ALL this stuff out of the area!?

A Krassel crew packs a 23 foot tandem load for a lookout antenna.

So as we pound people and stock up and down 15 miles of trail, it's easy to ask if a helicopter wouldn't have served the same purpose. It's a question frequently asked. A relatively few helicopter trips with a sling could have concluded this project in a few short days. Now we are faced with three years of packing. We are still faced with a tractor and ore bin that we don't have a solution for.

The District made an up front decision to tackle the Yellowjacket rehabilitation project using primitive skills, meaning we would not request or depend on motorized equipment. For us, this was the minimum tool. We felt the rehabilitation could be done without resorting to modern (motorized) means. This was not the quickest, most convenient, and likely not even the cheapest choice and surely not the easiest for people and stock.

The Yellowjacket project illustrates a minimum tool paradox Wilderness managers often face: using primitive or traditional, non-motorized and non-wheeled equipment to clean up, rehabilitate, repair or maintain a site or facility that was developed using modern means. In the area that is now the Frank Church-River of No Return Wilderness many bridges, buildings, mines, and airstrips were constructed using modern motorized equipment before Wilderness designation. The Yellowjacket Mine equipment was all hauled in by truck. The major bridges across the Middle Fork, main stem and South Fork of the Salmon River were all put in place with helicopter support. Without "modern" equipment these types of work situations - to clean up, rehabilitate, repair, maintain - would not even exist. Some facilities were designed to be maintained with "modern" equipment. So how "reasonable" is it to tackle the project work with "primitive" means? Use of modern equipment tends to create complex situations that users of "primitive" tools may have never envisioned or had to deal with!

How much emphasis should be placed on trying to "remove" the need for such work, hence avoiding the minimum tool question altogether (by removing a bridge the question of maintenance disappears). Even this solution requires a determination on how to remove the facility - using motorized or non-motorized equipment. In many situations removal is clearly not a practical solution. But if it's not, and the facility is to be retained, does it make sense to use "primitive" methods to maintain a modern structure?

Is "minimum" perhaps the same type (era?) of tools and equipment that were used initially in creating the "need" for the work? Or is it truly the lowest common denominator for accomplishing the work?

Does this mean, for example, that if the trail was originally constructed using hand tools that those same types of tools should be used in any reconstruction and maintenance? If so how do we deal with such "primitive" mechanical (wheeled) equipment as wheelbarrows, which were commonly used in trail construction projects in the "old days"? Should they then be considered as the "minimum" tool in heavy maintenance or reconstruction projects today, even if it is "possible" to do the work without such equipment?

Aren't there always non-motorized/non-mechanical options, which use "primitive?" skills and talents? If there aren't such means maybe the project is not appropriate to the Wilderness in the first place and we should re-assess the answer to that first question regarding NEED for the project. So, in this context, do we ever need to use motorized/mechanical equipment? Does this define "minimum tool?"

Another minimum tool dilemma - often the job could be done faster with power tools. For example, a common suggestion is to use chain saws early in the season before anyone is in the area, quickly opening trails or repairing bridges, leaving a bit of noise and a few saw tracks on log ends. The disruption of any visitor's experience would be "minimized," and we would get our work done sooner, ideally getting more done and perhaps "minimizing" the travel obstacles and possible safety hazards facing visitors. Maybe there are a lot of trees or they are big. Perhaps we feel the work could be completed not only faster, but more safely, with a chain saw. Are these legitimate considerations in making a minimum tool choice?

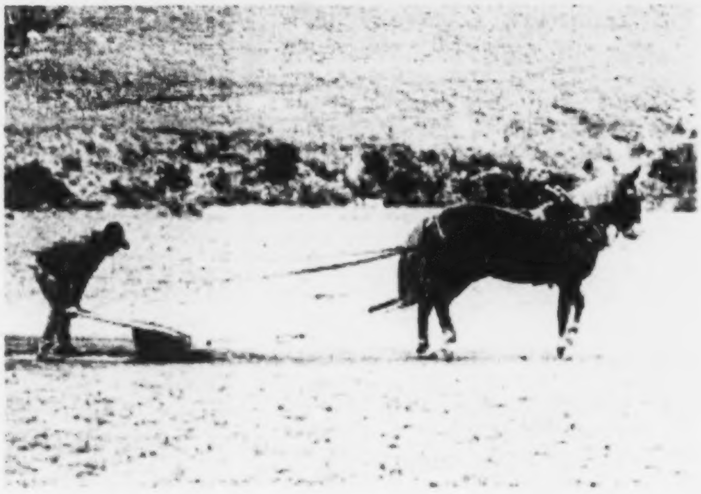
How are we supposed to make such determinations? It's a quandary that we seem to face often, and a question not easily answered. There are no clear criteria to make the call. Does the project need to be done for protection and propagation of the Wilderness resource? If so, how do we accomplish it in a Wilderness sensitive manner, with the least possible disruption to the Wilderness environment, both physical and spiritual? What is the MINIMUM tool? It's not supposed to be a question of speed, money or convenience, but simply minimum requirements to complete the project.

We live in a modern world, and frankly our minds have been conditioned to rely on modern methods of completing tasks. Simply based on familiarity there will be a natural tendency to tune

Minimum Tool

Airstrip Project Revives Draft Horse Skills

Another paradoxical situation: maintain, using the minimum tool, an airstrip built with a cat and used by modern motorized aircraft. The Cobalt and North Fork Ranger Districts tackled the project with a training session that passed along traditional horse handling skills that are being lost.



Tammy pulls another skidfull of fill onto the airstrip for Jim.

The Bernard airstrip, located next to Bernard Guard Station on the Middle Fork of the Salmon River, is one of seven Wilderness airstrips in the Frank that are maintained by the Forest Service under the Central Idaho Wilderness Act of 1980. The airstrips were constructed using motorized equipment before the area was designated Wilderness. The Bernard airstrip is used by boaters during the summer and by many hunters using the airstrip and grounds during the fall. It is 30 miles upstream from the confluence of the Middle Fork and the Salmon River. It is 20 trail miles to the nearest trailhead at Meyer's Cove.

Because the Idaho Department of Aeronautics identified the Bernard airstrip as needing repair, the Cobalt Ranger District personnel decided to complete the maintenance using traditional horse-drawn equipment. "We decided not to use any motorized or wheeled equipment even though we had quite a bunch of fill to move," said Cobalt's trail crew foreman Bill Hickey.

The project also looked like an excellent chance to revive some disappearing skills, so, working with Jim Upchurch of the North Fork District, Bill hosted a "traditional tools" workshop. They invited others from the Frank Church Wilderness and the Selway Bitterroot Wilderness to join in.

Everyone who participated in the three-day workshop had previous experience handling saddle horses and pack stock, but working with draft horses was new to most. "We got Ray Follett to come along and show us how it's done," Hickey said. (At 72, Ray has been working with draft horses all his life. He recently retired from the Forest Service and still had his own team of horses.) "We've lost many skills associated with horse-drawn implements," Hickey said, "and we need to find 'old timers' like Ray to teach those skills so we can use them in the Wilderness."

Whether he was adjusting a harness, coaching teamsters, "coaxing" the horses, or offering helpful tips, Ray's skills were a vital part of the workshop.

The airstrip had some major holes and dips, mainly caused by airplane takeoffs. Using the horses and slip skidders, the crew loaded fill, dragged it to the low spots and spread it out. Then they used a harrow to further level the fill and smooth the surface of the strip. It took lots of trips with skidders and harrows to haul and distribute all the fill needed to level out the strip.

The crew used pry bars, shovels and a horse-drawn stone boat to remove some rocks from the strip. The team also had a chance to try out a horse-drawn trail plow during the workshop.

"The workshop was a great success. We got most of the airstrip repaired using the minimum tool," said Hickey, "and we learned a lot about using horses to pull loads. Even more important, we really got a feel for the skills involved. These skills will be useful as we complete the work of the airstrip next spring."

Pondering continued

into these modern methods. Methods which will often (but not always) be the quickest, most convenient way to tackle the work, but may NOT be the minimum tool. It may be necessary to break out of the societally imposed mindset, and look for innovative ways to work that is beneficial and appropriate to the Wilderness and protects the experience that is available for visitors.

The bottom line in this struggle is to make the minimum tool decision that protects the values and integrity of the Wilderness. To a large extent the commitment, understanding and woods skills of the managers of the Wilderness will be the key factors in making this type of decision, which will unavoidably have a subjective side. It is very doubtful that the call is ever going to be very clean or very easy.

Sometimes A Motor Is The Minimum Tool

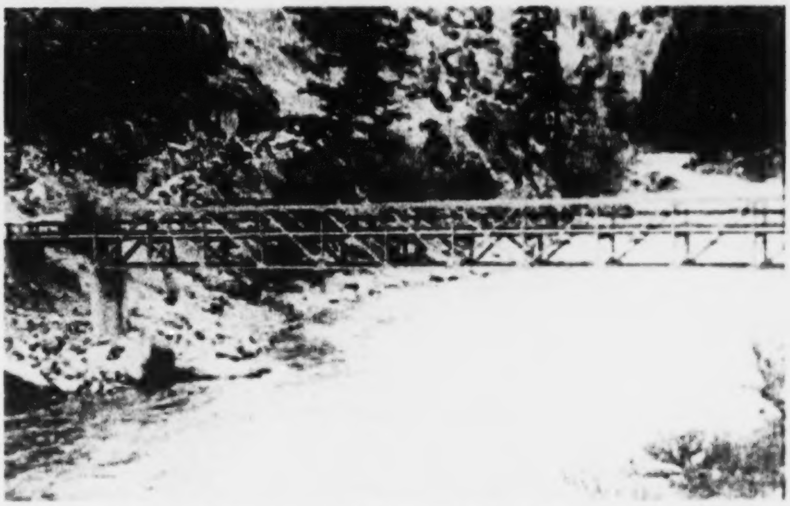
Traditional tools and non-motorized work are a way of life in the Wilderness. But, sometimes it is not possible to do the job without relying on motors. The Cobalt Ranger District was faced with a complex bridge maintenance problem that shows that sometimes the minimum tool is a motorized tool. It involves another paradox involving pre-Wilderness facilities.

In 1956 and 1957 a series of steel pack bridges were constructed in the Idaho Primitive Area along the Middle Fork of the Salmon River. The bridges were constructed using aircraft, jet boats, rafts, helicopters and a variety of traditional tools. In 1980 the Middle Fork and the bridges were included in the River of No Return Wilderness. By 1990 three of the bridges, one across Camas Creek, near its mouth, one across the Middle Fork at the mouth of the Big Creek, were in need of heavy maintenance. They were near the point of being condemned as safety hazards.

The Cobalt Ranger District began an analysis of the bridges to determine if they should be maintained and if so how. All three bridges were found to be essential components of the trail system linking the east half of the Wilderness with the west and providing early season access to the Middle Fork country by way of Camas Creek. They provide foot and horse travelers passage over streams too deep or swift to ford and are heavily used each year.

One of the options discussed was removal of the bridges and replacement with bridges that could be maintained with non-motorized equipment. But, the existing bridges will last over 100 years if properly maintained. Removal and replacement are not practical.

So the big question comes down to using motorized or non-motorized methods to maintain the bridges. The Waterfall bridge was constructed using steel "I" beams and can be maintained using hand tools to remove the rust and old paint and re-paint the bridge. Traditional tools will be used.



The Big Creek Bridge spans the Middle Fork of the Salmon River.

However, the larger Big Creek and Camas Creek bridges are built with steel trusses. Maintenance requires removal of all rust, oxidation and old paint and repainting. The problem is that the gusset plate joints on the bridges are very difficult to reach. The only effective way of getting the rust out and the new paint in is motorized sand blasting and paint equipment. Motorized maintenance was anticipated in the bridge design.

Other considerations: Thousands of river runners float past or under the bridges each summer. The bridges span streams that are critical habitat for the Chinook salmon, listed as a threatened species. The lead based paint on the bridges is a hazardous material so all debris, including paint chips, must be removed from the Wilderness. Because of the boating season and the Chinook runs, timing, both starting time and duration, was important. It was estimated that using traditional hand tools would take 10 to 15 times longer than motorized means.

In Region 4 the Regional Forester must approve any use of motorized equipment in Wilderness. In the case of the Big Creek and Camas Creek bridge projects the minimum tool for maintenance was determined to be motorized tools and mechanized transport. The reasons for approval were listed as follows: It is impractical to maintain this type of truss bridge and ensure proper protection and bridge integrity, without using motorized equipment. The bridges predate the Wilderness designation and sandblasting is the only method that will assure the integrity of bolted gusset plate joints. Motorized use - provides the least exposure to operational hazards to Wilderness users - can be accomplished outside the Wilderness high use period and have the least visual effect on users, - have least impact on site from work crew occupation, - has the shortest duration of all alternatives, - would be 100 percent effective in adequately maintaining the pressure rivets required to keep the bridge safe, - would have the least effect on threatened Chinook. It was determined that the motorized equipment use would have the least impact on the Wilderness resource and users in the long-term.

Funds are available for the Big Creek bridge project and a contract has been awarded. Work will begin in April 1994 and should be completed by the end of May.

The environmental and minimum tool analyses for the bridge projects were complex and time consuming. But in this case only careful analysis would reveal what the minimum tool is.

Minimum Tool

High Tech Provides Low Impact Tools

Sometimes new technologies provide tools that have little discernible effect on the Wilderness. Jeff Yeo of Taylor Ranch Field Station, Wilderness Research Center of the University of Idaho, explains the minimum tool may be a high-tech tool.

Since I started managing the Taylor Ranch Field station, surrounded by the Frank Church - River of No Return Wilderness, I've become re-acquainted with the satisfaction of using hand tools and horses to get daily chores done. But the minimum tool concept advocated in the Wilderness Act is not equivalent to using only traditional tools. It means using the minimum impact on the Wilderness environment. Sometimes the minimum tool is a high-tech tool.

For example: for decades biologists have marked animals to provide information on their survival and how animals use their environment. Marks included freeze-branding fish, clipping small mammal toes, tattooing ears, or fitting animals with colored collars. Recently developed passive induced transponder (PIT) tags are miniature electrical circuits imbedded in glass beads, small enough to fit inside a syringe. They are injected under the skin of fish, small mammals or amphibians to provide permanent, unobtrusive markers. Carrying no power themselves, PIT tags carry unique codes for each animal. When read directly into a computer data base, PIT tags provide long-term records of animal locations, conditions, and survival.

National Marine Fisheries Service has been PIT tagging juvenile chinook salmon for the past two years at Taylor Ranch. When these fish pass by PIT tag readers at each dam both migrating out to the ocean and, with luck, returning, the unique code embedded in the PIT tags they carry tell fisheries biologists where each fish hatched, its weight and length when marked and its rate of passage through the dams on the Snake and Columbia Rivers.

Recent technology using satellites and global positioning systems (GPS) allows Wilderness scientists to relocate points on the ground without the use of extensive stakes and markers. GPS's are hand-held devices about the size of a Sony Walkman which use signals from a group of satellites to triangulate each receiver's position on the ground. They can be used by Wilderness scientists to delineate changes in the boundaries of plant communities, stream channels, lakes and beaver ponds, locate permanent vegetation monitoring sites, or map distributions of wildlife.

Using new technologies we can now measure the most intricate of plant processes without measurably altering the Wilderness environment. Hand-held diffusion porometers, portable photosynthesis chambers, and stable isotope techniques, are just a few new tools available.

Portable high-tech equipment allows scientists to backpack or horse pack to remote, pristine areas without the need for long-term base camps. Once there, the same high-tech equipment allows minimum impact on the Wilderness.

In Wilderness science we find that continuing advances in technology allow us to conduct research with minimal environmental or social impact - the minimum tool. The challenge is to meld the high-tech equipment and techniques of modern science with the distinctively low-tech methods required by Wilderness travel and life. Much of Wilderness research still depends on the basics - strong legs, healthy lungs, and persistence, occasionally blessed by inspiration.

Edna Mule - Minimum Tool

Wilderness Rangers rely heavily on their mules to pack stuff in and out of the Wilderness. Mules are often the minimum tool. On long hitches Wilderness workers will talk to their mules. If they have been out long enough, the mules may start to talk back. Here is Edna's story of a Wilderness season - as told to Charley Mabbott.

It was another wild and hectic year for us mules. Just when I think I've seen about everything they can throw on me they really start getting creative. Maybe the rain gets things to growing in those big brains like it gets the grass growing at Storm Creek Flat. It's not the brains but those opposable thumbs that lets them be in charge the way they are. That's how they lock up the grain and stack the hay. That's how they tie knots and put on saddles and everything.

Anyway Harvey the packer comes up with this great idea to build waterbar carriers with chainlinks that go through the rings on our Decker packsaddles. Takes him about one minute to tie on a waterbar now. I hate waterbars! We packed a lot of them though. I guess you can get used to almost anything.

Waterbars were nothing compared to the culvert I packed out of the Wilderness. It was two feet around and five long and weighed way over a hundred pounds. Most mules would've rolled their saddles with a load like that. (These Wilderness rangers are full of surprises.) First he put up the off side - 100 lbs. of pipe and junk that used to be part of a spring development but now it's just garbage. Then he sets the front end of the culvert in the front barrel hitch loop, gets his shoulder under the back and, it's groaning time again...

A week later and everybody (except Jack - that little old sandbagger) is at the Swet Lake/Elkhorn 2nd annual cement packing reunion. A good time was had by all, even when the snow blew in. Hey, it wasn't dusty.

September was like going to Heaven without having to die first. Banjo and Charley and I coverin' country like no tomorrow. I like hunters. When we find any we stop and while Charley chats, we graze for awhile, unless they're in a beat down mud hole where we get to do penance by skipping lunch.

Then there was the time the jet streamed over so close I couldn't stand it. I bolted right when one side of the 6 foot crosscut saw was being untied and ended up bangin' against my legs as I ran...that was nerve racking or, nerve wrecking. But, it was interesting to hear those colorful expletives usually directed towards us equines being shouted into the sky instead.

That covers most of the excitement for 1993. Keep your grain dry.

Minimum Tool Decisions Can Be Tough

Minimum tool decisions are routine for Wilderness managers. But sometimes making the call gets complicated. Salmon National Forest Supervisor John Burns explains some of the factors that must be considered.

by John Burns

Dumping a load from a four legged belly dump.

Wilderness work projects are special. As Forest Service managers, we strive to get necessary maintenance and construction work done in a way that best protects the Wilderness resource and the solitude of users. Such things as trails, bridges, and field stations are needed and must be maintained.

Skills in the use of traditional tools such as the crosscut saw, ax, pack animals and single jacks, not only set an example for other Wilderness users but are woven throughout the Forest Service heritage. These skills helped establish the National Forests.

Whenever possible we avoid the use of motorized or mechanized equipment in the Wilderness, but deciding "yes" or "no" on some projects can be quite a challenge. On others it is simple and straightforward. For example, our trail crews routinely work with ax and crosscut saw opening hundreds of miles of trail each year. It's slower and more costly than if power saws were used. But clearly the word can be done in reasonable fashion with traditional tools. However, if the trail work requires a considerable amount of rock blasting, the manager may opt for a power driven rock drill in order to not tie the crew up for weeks on a short piece of trail.

Although dollar costs should not be a deciding factor on traditional tool versus motorized, the manager also needs to weigh available crew time, other work needs, timing and effects on the Wilderness resources and uses.

In some cases traditional tools could have an adverse effect on the Wilderness in the long run, while using motorized methods might have only a brief effect on solitude. For example, removing old electronic equipment from a mountain top site might require trail construction to the site for pack mules, while using a helicopter would produce only one day of noise for landing.

Projects that require large numbers of people, setting up camps for a long period, or numerous trips with pack strings may have negative effects on the soil, vegetation and trails. Perhaps such projects would best be done with machines rather than traditional tools.

Sometimes the safety of personnel or Wilderness visitors is a deciding factor or time is limited. Emergency rescue operations or evacuation for critical medical care are obvious situations where motorized transport is warranted.

The Forest Service Manual specifies the approval for authorizing motorized equipment. In all cases except emergencies, the approval requires preparing a justification statement. Of course new projects such as bridge or trail construction require an Environmental Assessment, and public involvement is part of that process.

A manager must weigh many factors and make the judgement call. Complex projects can't be merely run through an equation to come up with the right answer. The decision often has subjective elements. It boils down to what course will best protect the Wilderness and keep it a place where "the imprint of man's work is substantially unnoticeable?"

In most cases, a Wilderness visitor will hear no more than the sound of an ax, a single jack on drill steel or mule shoes on a rocky trail when a Forest Service crew in encountered. On rare occasions, though, it may be the chug of an air compressor or the brief whine of helicopter engine that is heard.

Minimum Tool Aid

In some cases there are no clear answers and the Wilderness manager must rely on judgment. The following questions can help Wilderness managers test each decision. The questions were developed by Linda Mergliano and Tom Kovalicky for an article entitled "Toward an Enduring Wilderness Resource" in the February 1993 issue of the Journal of Forestry.

1. Does your action insure that Wilderness is not occupied and modified?
2. Does your action maintain or move the Wilderness toward less human influence legal constraints?
3. Does your rationale allow Wilderness to retain spirituality and elements of surprise and discovery?
4. Did you evaluate the traps of making a decision based on economy, convenience, comfort or commercial value?
5. Did you look beyond the short-term outputs to ensure that future generations will be able to use and enjoy the benefits of an enduring resource of Wilderness?
6. Does the alternate support the Wilderness resource in its entirety rather than maximizing an individual resource?
7. Do you recognize the unique characteristics of this particular Wilderness?
8. Does the action prevent the effects of human activities from dominating natural conditions and processes?

Affirmative answers protect the Wilderness.

LESSON 6 • **Wilderness Literature**

Objectives:
Students will:

- identify an author's relationship with nature and the use of "story" to communicate this relationship.
- examine the intrinsic values of wilderness and the relationship between civilization and wilderness.

Background:
You will find a small sampling of wilderness-related literature in the Wilderness Reader. There is a wealth of writing on the subject of Wilderness. Often times the author draws connections between wilderness and civilization. The following activities are designed to expose students to authors associated with wilderness and their relationship to it. In Activity 1 students will select one of the readings, conduct background research on the author, and respond to discussion questions. In Activity 2 students will understand Edward Abbey's arguments for preservation of land as Wilderness. In Activity 3 students will understand Gary Snyder's view of wilderness and our culture's need and relationship for wilderness. For additional literature based activities about wilderness, see English lessons in the CONNECTIONS strand, page**.

Activity 1: The Power of Literature

Materials:

- Wilderness Reader: "Christmas in Driftwood Valley," Theodora Stanwell-Fletcher; Refuge, Terry Tempest Williams; "At Lobo Lake," Margaret Murie
- Teacher handout: "Discussion Questions", page**.

Duration: 1 to 2 class periods, possible homework

Location: indoors or outdoors

Procedure:
1. Students will select one piece from the collection to read and respond to questions from the teacher handout, page**.
2. Ask students to read the introduction to each story about the author's life experience (if it is available).
3. After reading the selected piece students will research the author's life and how life experiences affected their writing.

AMERICAN HISTORY
Perspectives; Literature

LESSON 7 • Historical and Cultural Perceptions of Wilderness

Objectives:
Students will:

- demonstrate that many different cultures settled the west and that each culture's response to the west and "wilderness" was unique.

Background:
Often only Euro-American's history is presented or discussed in any depth. We have focused a lot on the trapper, the explorer, the mountain men, the cowboy. This lesson offers a look into other cultures that were part of settling the West. It examines some stereotypes. There are cultural differences or 'cultural responses' to western settlement. The building of communities, and sustainability of livelihoods and communities (commerce) is witnessed on the frontier.

Through the interactions of these different cultural settlements one can see tremendous cooperation. The concept of settling a vast west required support to respond and survive in the harsh conditions of frontier living as individuals, communities and outposts. These concepts can elicit discussion on community, responsibility, and our connection to our environment.

The development of our frontiers (another fascinating concept in itself, refer to G. Snyder "The Etiquette of Freedom" in *Practice of the Wild*) has endangered wild lands. Wilderness, as a concept, has been a source of different attitude however, than the traditionally presented object to conquer. Other cultures demonstrate a different "frontier spirit"—they see the need to have sustainable resources for sustainable communities. The Hispanic culture presented in Anaya's piece shows a curandera's connection to wild lands and wild herbs. A deep respect for the natural processes of wild lands, the connection to the seasons and cycles shows a very different response to wildness; Not one of conquering, but of living with the wildness of the land.

Activity 1: A Letter too Late

Materials:

- Wilderness Reader: "A letter too Late," by Wallace Stegner in *Where the Bluebird Sings to the Lemonade Springs*

Procedure:
1. Read aloud sections, or have students read the entire essay by Stegner.
2. Through group discussion, explore the experience of Stegner's mother in a rural early twentieth century setting. Ask students to discuss how Stegner's mother feels about wilderness. Why?

Activity 2: Interacting on the Frontier

Materials:

- Wilderness Reader: *The Ancient People*, by Willa Cather; *Bless Me Ultima* (chapter selected), by Rudolfo Anaya

Procedure:

1. Divide the class into groups of up to 5 or 6. Have each group choose a group that they will represent.

Characters or groups of characters to be portrayed:

ranchero—the roles of the woman, the man and the children on a ranch in the San Luis Valley
scientific expedition—including a journal-keeper, a leader, cook, scout, artist
railroad company—manager, workers
Irish miners
shopkeeper
single woman
basket maker
salesman, trader
farmer family (white)
Native American woman
journalist woman, man
soldier
Eastern urban family settling the west
Basque sheepherder
curandera

2. In small groups have students contemplate what a "typical day" might be for one of the groups or individuals listed above. Have students use the library to research information on their character.

3. Randomly select two or more groups and have them discuss with each other where and how they might have interacted on the frontier. Have students present their thoughts to the whole class. This can be repeated by reshuffling the groups.

Procedure continued:

4. Have students write an essay describing one example of cultural responses to wilderness and either a conflict or cooperation that this response might elicit with other cultural groups.

Evaluation:

Evaluate the essay.

Career Options: historian, anthropologist, archaeologist, ethnologist

References:

- *The Ancient People,* Willa Cather
- *Bless Me Ultima,* Rudolfo Anaya
- *Frontiers of the Imagination,* Irene Diamond

LESSON 8 • **The Wilderness Commons**

Objectives:
Students will:
- understand the concept of capacity as it applies to human population and to the wilderness experience.
- differentiate between the ideas of Garrett Hardin and Gary Snyder.
- describe the outcomes of self-interest strategy vs. a cooperative strategy for managing renewable resources.
- explain how our stewardship of a resource can help to prevent us from exceeding the carrying capacity of the Earth.

Background:
As our growing population continues to place a strain on finite resources, the question inevitably arises: Are we decreasing the ability of the Earth to sustain life? How long can we continue to harvest from the world's forests and seas at today's rate? How much longer can we mine nonrenewable resources? Can soils that have lost their fertility through the global trend of desertification be restored? Can we expect to boost agricultural yields to feed growing populations? Will technology help us solve some of these problems or is technology helping us to borrow from future resources and thereby temporarily boost the carrying capacity of the Earth (O'Connor, 1995)? Consideration of these questions and the interrelated issues they involve form the framework of this lesson.

Christened by Garrett Hardin, the commons dilemma is derived from *The Tragedy of the Commons* written by William Forster Lloyd in 1833. The commons described by Lloyd is a pasture open to all. Herdsmen bring cattle to the commons to graze. Over time, each herdsman seeks to maximize his economic gain and adds cattle to his herd. The positive component , the increased profit, is realized by the individual herdsman. The negative component, the resultant overgrazing, is shared by all who use the commons. As each seeks to maximize his gain, the commons resource declines until overgrazing leads to its destruction. The dilemma: self-interest vs. cooperation; maximizing individual gain vs. cooperative stewardship of a resource (O'Connor, 1995).

In this lesson students will read two essays on the concept of carrying capacity and compare the author's ideas. Students will also have an opportunity to participate in a simulation activity to demonstrate their response as consumers of a resource in a commons. To conclude the lesson students will apply the "commons" idea to a wilderness scenario.

Activity 1: Tragedy of the Commons

Materials:
- Wilderness Reader: "Tragedy of the Commons" by Garrett Hardin
- student/teacher handout: "Tragedy of the Commons," pages 250.

Duration: 1 class period, homework assignment

Location: classroom

Procedure:
1. Assign the reading, "Tragedy of the Commons" from the Wilderness Reader. Allow plenty of time for the students to read this.

2. Discuss the following concepts presented in Hardin's essay. Spend time going over the main concepts from the "Tragedy of the Commons - Student Handout". Cover these main concepts:
    - Technical solutions
    - Mutually agreed upon coercion
    - Population
    - Commons
    - Freedom

Activity 2: The Place, the Region, and the Commons

Materials:
- Wilderness Reader: "The Place, the Region, and the Commons" by Gary Snyder
- drawing paper

Duration: 1 class period, homework assignment

Location: classroom

Procedure:
1. Discuss Snyder's essay. How does Snyder define the commons? (Snyder defines the commons as "the undivided land belonging to the members of a local community as a whole".) After discussing and reading some of Snyder's descriptions, ask students to draw what they imagine a commons to look like in earlier times. Have them jot down a few words they associate with commons.

Procedure continued:

2. Continue to discuss how Snyder makes a distinction between the real or historical commons and what Hardin describes as a commons. (Snyder renames Hardin's dilemma as "the dilemma of the common pool resource". He claims that is the difference because historical commons were social institutions that were not without rules or regulations and did not allow unlimited access.)

3. What is the wilderness in a historical commons? (Snyder does an excellent job of describing what wilderness, out there beyond the "far high rough end", was for managing the commons.)

4. What does Snyder advocate for managing of the commons? Local based. He describes new inhabitants of the west - the white culture - that invaded and displaced the Native American (with a closer connection to the health of the land) and had "neither the values or knowledge to care for the land". He makes the comment about place, how important a connection is for caring for the land. That's why he prescribes that land management be locally based.)

5. In today's society, with public lands and designated Wilderness lands, what kind of responsibility do we have for their sustainability? Discuss the concept of sustainability.

6. How might the "Wilderness experience", going out to seek solitude and peace and uninhabited land, be damaged or affected by too many people? Ask students to describe a technical and a nontechnical solution to this problem.

Activity 3: The Commons Dilemma

Materials:

- stop watch
- 2 pounds of peanuts in the shell
- 1 large bowl for every 4 students

Duration: part of a class period

Location: classroom

Procedure:

1. In this simulation, students will have an opportunity to demonstrate their response as consumers of a resource in a commons. The commons, a large bowl, represents the sea and the resource, fish, are represented by peanuts.

2. Introduce the demonstration with a discussion of the ground rules. Supply only the information needed to get students started. The dilemma and a discussion of the various strategies should surface at the outcome of the activity.

Procedure continued:

3. Divide students into groups of four and give each a bowl with 16 "fish". Go over ground rules:

Ground Rules

1. The object of the game is to harvest (remove from the bowl) as many fish as possible from the sea.

2. At carrying capacity, there are 16 fish (peanuts) in this sea (bowl). For every four fish each student harvests he/she will receive one point. The more fish you harvest, the more points you will receive. (If you feel students need additional motivation, you can name a reward for the individual who receives the most points.)

3. When the game begins, you may harvest all of the fish, some of the fish, or none.

4. You will have 4 twenty-second trials in which to harvest fish. You will be notified when to start and stop each trial.

5. If fish remain in the sea after each trial, a new fish will be added for each one remaining. If there are four fish left, four more will be added. But for each new trial, the total number of fish in the sea cannot be more than the carrying capacity of 16 fish.

Repeat the demonstration with eight students in each group to simulate population growth. Keep all other factors constant.

4. Conduct a group discussion immediately after the activity. Discussion Questions:
    - What were the maximum number of points achieved by any individual? Any group?
    - Why were fish only replaced if some remained in the bowl after each trial? (Simulates natural conditions; if all fish are harvested, no additional fish will be born.)
    - What happens when members of a group do not use a cooperative strategy?
    - What was the best strategy for harvesting from this commons? (eight from each trial)
    - What are some of the "commons" we share as citizens of planet Earth? What are some of the dilemmas we face as an expanding population?
    - How will cooperative stewardship of resources help us to resolve our commons dilemmas and prevent us from exceeding the carrying capacity of our environment?

Credit:

Living Lightly On the Planet, A Global Environmental Education Curriculum Guide, Schlitz Audubon Center, National Audubon Society.

AMERICAN HISTORY
Perspectives; Literature

Activity : The Wilderness Experience

Materials:
- paper or student journal and pen or pencil

Duration: 1 class period

Location: classroom

Procedure:
1. As closure, review the concepts of freedom, self-interest, responsibility and coercions that might relate to this Wilderness scenario:

   Every summer for fifteen years, you have hiked up to a small, secluded lake and spent the afternoon, or sometimes over night. It was a time for you to relax, fish, read, stare, nap, write, draw and just be by yourself. You rarely saw anyone, and there was little evidence that many people ever came to this lake. As the years went by, more and more often there would be people at the lake. It didn't bother you at first because you knew the lake so well that you could find nice spots where you couldn't be seen and were still secluded. Gradually there were so many people that many of your spots were either occupied by the new visitors, or had unpleasant evidence of people having been there; trash, no more plants or flowers and sometimes human waste.
2. Either as a writing assignment or small group discussion answer the following questions: How does this make you feel and what do you want to do. Examine the concepts of population, freedom, commons, mutually agreed upon coercion, and technical solutions.
3. Have students discuss the activities in small groups. Have them answer the question: What is the connecting theme or pattern in these activities. Each group can report back to the class. Have students write an essay answering the same question.

Evaluation / Follow-up / Extension
Evaluate the report/essay

Career Options:
Wilderness manager, population analyst, philosopher, nature writer

References:

- Snyder, Gary. The *Practice of the Wild.* San Francisco, CA: North Point Press. 1990.
- Harding, Garrett and Baden, John. *Managing the Commons.* San Francisco, CA: W.H. Freeman. 1977.
- O'Connor, Maura. *Living Lightly On the Planet, a Global Environmental Education Curriculum Guide.* Second Edition. Milwaukee, WI: Schlitz Audubon Center. 1995.

Activity 1: Tragedy of the Commons

STUDENT/TEACHER HANDOUT

Tragedy of the Commons

Hardin presents the scenario of growing populations and the correlating depletion of resources. He examines the economy of the "commons," and the inevitable tragedy of the commons through unlimited use, specifically resource use associated with growing populations.

Of many points and thoughts that Hardin provokes, five have a translation to Wilderness. This lesson begins with exploring Hardin's notions, examines them with the present day issue of population, and closes with how these thoughts relate to wilderness use management.

The five points are—technical solutions, mutually agreed upon coercion, population, commons, freedom.

Technical solutions: Hardin describes technical solutions as "one that requires a change only in the techniques of the natural sciences, demanding little or nothing in the way of change in human values or ideas of morality."

> What are some examples of technical solutions? What would be another solution that would not be technical? **Landfill capacity** —a technical solution would be to develop a machine that would crush materials better, or find new land for a landfill. A nontechnical solution might be to reduce waste, reduce packaging of products etc.
>
> In these two contrasting solutions, one implies that the cause or root of the problem is changed, involving change in human behavior, not a technical but one of values, or ideas of morality.

Population: Economics or math may be the focal points. Hardin explains not only how increasing populations deplete resources (reduction in goods), but how our society must adjust our individual freedoms.

Commons: Hardin describes the logic of the commons, individual herdsmen trying to maximize their gain. With population controls, such as internal wars, disease, and famine, the commons has enough resources (range land in this case) to sustain the population. But with a growing population, the gains are reduced. The tragedy is that each man is "compelled to increase his herd without limit—in a world that is limited."

Activity 1: Tragedy of the Commons

STUDENT/TEACHER HANDOUT

Tragedy of the Commons

continued:

Snyder takes another interpretation of the historical commons. Snyder points out that the commons were regulated by ethics, codes and traditions; that is essentially self regulation. The social organization of the commons involves individual/social values and ideas of morals and ethics. This makes for excellent discussion.

Hardin applies this notion to National Parks. Snyder applies it to public lands and Wilderness.

The ruin of the wilderness experience by too many people seeking the experience is another application of these concepts. Crowding may destroy what we are looking for when we go to a Wilderness for solitude.

Mutually agreed upon coercion is a social arrangement, like taxes; not something we enjoy, but have accepted as our social responsibility. Mutually agreed upon coercion is really responsibility—it limits self-interest for the common good. Look at Hardin's remarks on a commons in this section—"the alternative of the commons is too horrifying to contemplate. Injustice is preferable to total ruin." This brings up the class system, that some people must have the larger percentage of wealth or private property. Hardin is essentially accepting inequities, classism, perhaps even oppression. Further readings of Hardin's philosophy reveals the controversial concept of triage, which may be too advanced for some students. And the controversy could create some intense discussion. A discussion on this can go many directions however, and that is the art of teaching!

Freedom: "Freedom is the recognition of necessity." Quite a controversial statement. Use Hardin's example of mutually agreed upon coercion—passing laws against robbery; he explains that we are more free as a result of the protection or enforcement of this law and it is mutually agreed that robbery is not allowed.

Hardin suggests that we are a long way off in abandoning the commons in matters of pleasure. Neither are we near abandoning what might be considered the commons of natural resources, specifically the use of public lands for resource extraction—wood products, natural oil and gas, minerals, and rangelands. We have passed laws that regulate resource extraction on our public lands. We also agree to limit our use of wilderness to protect our opportunities to experience solitude.

AMERICAN HISTORY
Communication Arts; Research

Lesson 9 • **Wilderness Heroes & Heroines**

Objectives:
Students will:

- research one person who has already been selected as a wilderness hero or heroine and list three important biographical facts about him or her.
- list at least three important values held by this person about wilderness or the environment and its preservation.
- list at least one action this person took to protect and preserve wilderness or wildlife.
- list reasons why there is an absence of wilderness heroines in our history books and other reference materials, who these heroines are/were, and what their contributions have been to wilderness and wildlife.

Duration: 1 week to an extended time frame to conduct research

Location:
Indoors for showing videos and conducting research, other activities can be done indoors or outdoors.

Background:
Today we have approximately 104 million acres designated as Wilderness. Wilderness provides us with scenic, ecological, geological, scientific, educational, and historical values. Each of us may seek different values from wilderness. Wilderness heroes and heroines are chosen partly because they hold certain values in common with those who select them. Very few heroes and heroines believe in everything we do or behave in ways that we totally approve. Values that are not like ours aren't necessarily wrong; they are sometimes simply different. This means, we can select a variety of heroes as models and others can respect our different choices.

Many individuals have worked to advocate stewardship and land preservation over the past 200 years. Much of what we have and enjoy today as Wilderness, we owe to people like John Muir, Henry David Thoreau, Ernest Thompson Seton, Margaret and Olaus Murie, Bob Marshall, Arthur Carhart, Wallace Stegner, Sigurd F. Olson, Howard Zahniser, and Aldo Leopold.

These people are admired and respected for their qualities and achievements in preserving wilderness and promoting a land ethic. They have emerged as heroes and heroines because of the energy they devoted to changing the way society looks at wildlife and wild places. Wilderness heroes and heroines come from all walks of life and their contributions to wilderness may come as a result of their writing as naturalists, political leaders, artists, or field scientists.

Background Continued:

In this lesson, students will study the values & actions of historic heroes and heroines in order to help them develop and refine their own wilderness and land ethic.

Materials:

- videos: *Wild By Law, The American Experience: Battle for Wilderness*
- Student Handouts: "Wild By Law Discussion Questions," page 255.
- Teacher Handouts: "Answer Key for Wild by Law Discussion Questions," pages 256-258 or "Battle for Wilderness," pages 225-228.

Suggested Reference Materials:

- books: *Words for the Wild, The National Forest Idea, Centennial Mini-Histories of the Forest Service, The First 75 Years, National Park Service*
- journals: *Women and the History of American Conservation*, Women in Natural Resources, Vol. 11, No. 3

Activity 1: Wilderness Heroes and Heroines

Procedure:

1. Show students one of the following videos: "Wild By Law" or "The American Experience: Battle for Wilderness" on the life of a wilderness hero or heroine so all students can view it and learn about the same person. Use one of these videos to show students how to identify significant biographical facts and environmental values that made this person a hero or heroine. Discussion questions for "Wild By Law" can be found on page 255.
2. Engage students in discussion on the following questions:
   - How was this person's life like yours? (list on the board)
   - How was it different? (list)
   - What values did this person develop because of his/her life experiences? (list)
   - Of the values listed, which three do you think brought them the most fame? Why?
   - Can we pick the three life experiences (biographical facts) which helped these values develop? If there is disagreement about what is "most important", discuss this and the reasons why we each value different things as important.
   - Why do you think there are so few women recognized in history as heroines for wilderness and wildlife? Do they exist? Who are they and what contributions have they made? (list)
3. After students have examined the life of the same hero or heroine, ask them to each select a person to investigate from the resource list accompanying this lesson on page 259. Encourage students to add names of heroes and heroines to the resource list. Provide students with additional resource information to find examples of wilderness heroines.

Evaluation / Follow-up / Extension

- Evaluate student research skills and research paper that students have completed on a wilderness hero or heroine.
- Make a chart containing the headings: name of hero or heroine, biographical facts, and wilderness values. Compile these into a journal to be shared by all of the students.
- Explore how the times during which selected heroes and heroines lived might have impacted their values. How were they affected by other things going on in the region, state, country or world. Consider how these events encouraged or limited their achievements.
- Research the role models who influenced the selected heroes and heroines. Create an environmental values "family tree" showing the connection that each generation of heroes and heroines had to the next. Consider yourself in the family tree and imagine who will follow you.
- Write a play, story, poem or song or make a slide show or video about the heroes or heroines you have identified. Share these stories with your school and community.
- Assign an essay to address the question, "Who will be the wilderness heroes and heroines of the future?"

Career Options:

nature writer, naturalist, artist, policy maker, environmental activist, playwright, natural resource professional, religious or spiritual leader, environmental educator, teacher, outdoor photographer

References:

Lesson adapted from "Environmental Heroes and Heroines" by Dr. Clifford E. Knapp.

STUDENT HANDOUT
Wild by Law Discussion Questions

1. Who were the three men who fought to save 90 million acres of Wilderness?

2. Describe what symbolic & physical effects the automobile had on Wilderness.

3. What is the thing Americans did that no other country had ever done?

4. What did the 20th century provide, in the name of progress, for the average American citizen?

5. Describe Aldo Leopold's professional and personal life. Explain how Aldo Leopold's attitudes toward wildlife changed.

6. Name the first official Wilderness area in the United States. When did this happen?

7. What was Bob Marshall's answer to the question: How many Wilderness areas do we need?

8. In one paragraph each, describe Bob Marshall, Aldo Leopold, Howard Zahniser. What did they all share in common? What were their unique contributions for Wilderness?

9. What did the "Dust Bowl" years teach people? How did these attributes affect Wilderness?

10. What was the greatest threat to Wilderness after the Depression?

11. Why do you think *A Sand Country Almanac* is such an important book?

12. What was the Wilderness movement of the 20th century about?

13. By 1950, how many conservation organizations were there in America? What were their concerns regarding Wilderness?

14. Explain the controversy and history of Dinosaur National Monument. What did the controversy have in common with Hetch Hetchy in the Yosemite Valley?

15. How long did it take to pass the Wilderness Act? How many versions of the bill were there before one passed? How many congressional hearings were held?

16. What is the National Wilderness Preservation System? What acreage and percentage of the land base in America is currently designated Wilderness?

17. Will America ever be done with the debate over how much land to protect? To develop? Explain your answer.

18. Describe in one paragraph how you felt when you heard the wolf howl.

AMERICAN HISTORY
Communication Arts; Research

TEACHER HANDOUT: Answer Key
Wild By Law Discussion Questions

1. Who were the three men who fought to save 90 million acres of Wilderness?
Response: Aldo Leopold, Bob Marshall, and Howard Zahniser

2. Describe what symbolic & physical effects the automobile had on Wilderness.
Possible Response: The automobile was a symbol of freedom and progress. It made the Wilderness accessible. Roads brought people—tourists, loggers, miners, and builders. Cars and roads took people to see the country. Answers may vary.

3. What is the thing America did that no other country had ever done ?
Possible Response: It passed a law to protect its last remnants of wild land forever.

4. What did the twentieth century provide, in the name of progress, for the average American citizen?
Response: A vote, the national anthem, a bank account, and a high opinion of themselves

5. Describe Aldo Leopold's professional and personal life. Explain how Aldo Leopold's attitudes toward wildlife changed.
Possible Response: Aldo Leopold was a forester who saw his job as one of "managing" the wilderness. He initially felt fewer wolves would mean more deer; meaning no wolves would provide a hunter's paradise. After watching the green fire die in the wolves' eyes, he sensed that neither the wolf nor the mountain agreed with such a view. Over the years he watched wolves hunted down, and deer multiplied, then weakened and died. He came to the conclusion that the highest use for this land is no use at all. We need to set certain corners of the Earth aside as Wilderness.

6. Name the first official Wilderness area in the United States. When did this happen?
Response: The Gila Wilderness, in 1924. It represents deserts and ancient cliff dwellings.

7. What was Bob Marshall's answer to the question, How many Wilderness areas do we need?
Response: He answered, "How many Brahm's symphonies do we need?"

8. In one paragraph each: Describe Bob Marshall, Aldo Leopold, Howard Zahniser.
What did they all share in common? What were their unique contributions for Wilderness?
Possible Response: Aldo Leopold was a thinker, a scientist, a family man; a forester, turned philosopher. Bob Marshall was a wealthy man; a millionaire turned socialist, an adventurer who liked to hike and count things; and an exuberant mountain man. Howard Zahniser was a tireless bureaucrat who possessed a love for wild places he seldom saw. All three men were passionate that something was being lost, something sacred, something important was vanishing.

TEACHER HANDOUT: Answer Key
Wild By Law Discussion Questions

9. What did the "Dust Bowl" years teach people? How did these attitudes affect Wilderness?
Possible Response: One-third of the nation's topsoil had blown away. Something had gone awry-a bulldozer mentality. It taught people how scientific knowledge, expertise, and technology could be misused and misapplied. We've not always been prudent. We need to reexamine our thinking and ways of doing.

10. What was the greatest threat to Wilderness after the Depression?
Possible Response: Tourism. The Wilderness was in danger of being "loved to death". We built an expanding web of roads through the national parks.

11. Why do you think *A Sand County Almanac* is such an important book?
Possible Response: The book says things people feel deep in their heart but don't know how to say. It provides a sense of relationship to the land, the morality of people relative to other species, and the importance of beauty.

12. What was the Wilderness movement of the 20th century about?
Response: It was about restraining urban industrialism and to redefine progress and development.

13. By 1950, how many conservation organizations were there in America?
What were their concerns regarding Wilderness?
Response: 300 organizations. Wilderness preservation had become a national crusade.

14. Explain the controversy and history of Dinosaur National Monument.
What did the controversy have in common with Hetch Hetchy in the Yosemite Valley?
Possible Response: The Dinosaur National Monument was designated to protect a wild canyon from being dammed. Conservation groups urged people to float the Green River to see what would be destroyed. The public feared that what had happened with the damming of Hetch Hetchy in Yosemite National Park would happen here. They didn't want to repeat this disaster. Preservationists won a national battle for wilderness and against developments in national parks.

15. How long did it take to pass the Wilderness Act? How many versions of the bill were there before one passed? How many Congressional hearings were held?
Response: Howard Zahniser spent 8 years lobbying for the passage of the Wilderness Act. He saw 66 bills through rewrites, and spoke at all 18 congressional hearings around the country.

16. What is the National Wilderness Preservation System (NWPS)? What acreage and percentage of the land base in America is currently designated as Wilderness?
Possible Response: Zahniser's solution was to create a NWPS, giving Congress power to designate permanent Wilderness areas. 9 million acres were preserved as NWPS in 25 years. The system contains nearly 104 million acres, or 4 percent of the country.

AMERICAN HISTORY
Communication Arts; Research

TEACHER HANDOUT: Answer Key
Wild By Law Discussion Questions

17. Will Americans ever be done with the debate over how much land to protect? To develop? Explain your answer.
Possible Response: Answers may vary. People argued for a redefinition of progress. They wanted America to change its mind. Saving the last vast tracts of wildlands was a new way of understanding the world and seeing the wildness in small things.

18. Describe in one paragraph how you felt when you heard the wolf howl.
Possible Response: Answers may vary!

STUDENT HANDOUT

Wilderness Heroes and Heroines Resources List

Abbey, Edward
Adams, Ansel
Albright, Horace
Audubon, John J.
Austin, Mary
Bierstadt, Albert
Bird, Isabella
Black, Elk
Bradley, Jim
Broome, Harvey
Brower, David
Burroughs, John
Carhart, Arthur
Carrighar, Sally
Carson, Rachel
Catlin, George
Church, Frank
Comstock, Anna Botsford
Cooper, James Fenimore
Douglas, William O.
Eiseley, Loren
Emerson, Ralph Waldo
Giono, Jean
Greeley, William B.
Hunter, Celia
Jefferson, Thomas
Johnson, Lady Bird
Johnson, Lyndon
Jackson, Harriet West
Jardine, William H.
Krutch, Joseph Wood
Lee, Katie
Leopold, Aldo
London, Jack
Marsh, George Perkins
Marshall, Bob
Mather, Stephen T.
Mills, Enos A.
Muir, John
Murie, Margaret
Murie, Olaus
Nelson, Gaylord
Olmsted, Frederick Law
Olson, Sigurd
Petzoldt, Paul
Pinchot, James Mrs.
Pinchot, Gifford
Roosevelt, Theodore
Sacajawea
Seattle, Chief
Seton, Ernest Thompson
Snyder, Gary
Stegner, Wallace
Thoreau, Henry David
Udall, Stewart
Walton, Izaak
Wayburn, Peggy and Ed
Whitman, Walt
Williams, Lydia Phillips
Zahniser, Howard

AMERICAN HISTORY

American Government, Communication Arts, Speech/Debate Connection

LESSON 10 • Prohibitions and Conflicting Use in Wilderness

Objectives:

Students will:

- define and understand the word "compromise" and apply their definition to the Wilderness Act of 1964.
- analyze specific language in the Wilderness Act to better understand nonconforming uses allowed in Wilderness.
- discuss and answer questions regarding nonconforming uses allowed in Wilderness.
- design solutions to user conflicts in Wilderness.
- report views about prohibitive and conflicting uses in Wilderness.

Location: Classroom

Background:

Westward expansion in the early 1800's changed forever the American Wilderness landscape. Government policies like the Homestead Act of 1862 encouraged development of our natural resources. Today roughly 4 percent of the United States remains relatively free of human development. But it was not until 1964 that the Wilderness Act protected these remaining wildlands. Many Wilderness areas still contain remnants of historical human use and development, for example; American Indian artifacts and sites, wheel tracks from westward-traveling pioneers, cabins and lookouts. Only through compromise and many years of political struggle did the Wilderness Act have any chance of passage through Congress. Representations of special interests like mining, private property in-holdings, grazing, and water rights demanded that land use rights held before the Wilderness Act became law be allowed to continue.

These nonconforming (but allowed) uses in Wilderness present a great challenge to Wilderness managers held responsible to the American public to "Keep The Wild" in Wilderness, unimpaired for future generations. Some people view these nonconforming uses as incompatible with the goals of the Wilderness Act. They see Wilderness as a place to get away from the rest of our fast paced, civilized life. The Wilderness Act defines wilderness as: " ... in contrast with those areas where man and his own works dominate the landscape,...an area where the Earth and its community of life are untrammeled by man,...where man himself is a visitor who does not remain,......without permanent improvements or human habitation,...protected and managed to preserve its natural conditions,...affected by the forces of nature,...the imprint of man's work substantially unnoticeable,...outstanding opportunities for solitude or a primitive unconfined type of recreation."

Background, continued:

Compromise is the best way to explain why we still have islands of Wilderness. Yet compromise also explains why we continue to allow uses like air strips, grazing, mining claims, dams, and private property within Wilderness boundaries.

Students will read the student/teacher handout on "Prohibitions and Conflicting Use" as background information and study the Wilderness Act to understand why these nonconforming uses are permitted and allowed. In a final exercise students will apply critical thinking skills to write an editorial article on their opinion of one nonconforming use allowed in Wilderness.

Activity 1: Prohibitions and Conflicting Use in Wilderness

Materials:

- student/teacher handouts: "History of the Wilderness Act of 1964"; pages 264-265.
- student/teacher handout: "Prohibitions and Conflicting Use", pages 267-269.

Procedure:

1. Write the word **COMPROMISE** on the chalk board. Ask students to look the word "compromise" up in a dictionary. Ask them to share the definition as you write it on the chalk board. Use this to introduce the lesson on "Prohibitions and Conflicting Uses in Wilderness."

2. Use the Wilderness Act student and teacher handouts, to get students thinking about what activities are allowed in Wilderness. Go over responses now or at the end of the lesson.

3. Assign student/teacher handout "Prohibitions and Conflicting Use" as individual or small group reading.

4. Assign one-to-two nonconforming uses to each small group:

• road construction • private in-holdings •commercial services • airstrips • mining
• water rights • grazing • motorized equipment • mechanized equipment

Writing assignment: ask each group to find specific language in the Wilderness Act addressing this use. Ask them to rewrite the language in their own words.

5. Engage students in discussion. Ask the following questions:

- Why do you think nonconforming uses are allowed in Wilderness?
- If you make a living as a miner or rancher, why are these nonconforming uses in Wilderness important to you?
- Do you think these nonconforming uses are compatible with the idea of Wilderness? Why? Why not?
- Why was compromise critical to the passage of the Wilderness Act?

Activity 2: Summing It All Up, What Do You Think?

Materials:

- examples of newspaper editorials
- paper and pencils or pens

Procedure:

1. Explain or review what a newspaper editorial/opinion piece is. Ask students to write an opinion piece, selecting one nonconforming but allowed or permitted use in Wilderness.
2. Evaluate the assignment for these variables: structure, grammar, appearance and clarity for presenting their point of view. Assure students they will not be graded for what view point they select to write about since many points of view are important and essential in a democracy.
3. Make sure students submit assignments to a local newspaper, or perhaps have class vote on which ones to sumit.

Evaluation / Follow-up / Extension

- Evaluate student assignments from activities with this lesson.
- Interview a member of your congressional delegation or staff member who works in the field office nearest to your community. Ask them how the Wilderness Act affects their state wildlands.

Career Options:

farmer, rancher, homesteader, miner, pilot, commercial outfitter, Wilderness manager, outdoor writer, outdoor retailer, lawyer, civic leader

References:

- *Wilderness Awareness Training Module*, Arthur Carhart National Wilderness Training Center

Supplemental Activity 3: Mechanized Mountain Biking

Materials:

- copies of the Wilderness Act , "Wilderness: An Overview" section of the curriculum, pages 46-53.
- student teacher handout: "Prohibitions and Conflicting Use" from Activity 1, pages 267-269.

Procedure:

1. As a creative writing activity or skit, ask students to assume the role of a Wilderness ranger. On a backcountry patrol in the Wilderness you meet a group of people riding their mountain bikes. Is this recreation use allowed in Wilderness? Why? Why not? Describe or present the scenario of what you would say to the group. How would you respond to their statement, "Mountain bikes don't impact the trails the way horses do"?

Procedure continued:

How come horses are allowed but mountain bikes aren't?"

2. Encourage students to review these sections of the Wilderness Act, "Prohibitions of Certain Uses" and "Special Provisions" and information from the Student/Teacher handout on "Prohibitions and Conflicting Use" to help them see bicycles are not allowed in Wilderness areas because they are a mechanized machine.

Activity 1: Prohibitions and Conflicting Use in Wilderness
STUDENT HANDOUT
History of the Wilderness Act of 1964

Statewide wilderness bills have passed for most states or regions (excepting Idaho, Montana, and Utah) designating wilderness and releasing other areas for non-wilderness uses. Some National Forest Land and Resource Management Plans contain further recommendations for wilderness. There are nearly 12 million acres of potential wilderness in National Parks and Monuments and National Wildlife Refuges that Congress has not yet acted on. The Bureau of Land Management is reviewing its wilderness study areas and preparing recommendations for wilderness designations.

WILDERNESS ACT TEST

According to the Wilderness Act of 1964, check off what is allowed in wilderness:

	YES	NO	SOMETIMES
• permanent roads	___	___	___
• horses, mules, llamas, & goats	___	___	___
• collecting antlers	___	___	___
• rock bolt climbing routes	___	___	___
• scientific research	___	___	___
• noxious weed control	___	___	___
• dams and water development structures	___	___	___
• helicopter rescues	___	___	___
• native fish stocking	___	___	___
• cellular telephones	___	___	___
• trail signs	___	___	___
• logging	___	___	___
• mining	___	___	___
• oil & gas development	___	___	___

WILDERNESS ACT TEST continued:	YES	NO	SOMETIMES
• cattle grazing	___	___	___
• motorbikes and four-wheelers	___	___	___
• chainsaws	___	___	___
• hunting	___	___	___
• fishing	___	___	___
• trapping	___	___	___
• mountain bikes	___	___	___
• backpacking	___	___	___
• historic cabins & lookouts	___	___	___
• lightning-caused fires	___	___	___
• camping	___	___	___
• dogs	___	___	___
• wheelchairs	___	___	___
• snowmobiles	___	___	___
• commercial outfitters	___	___	___
• low level aircraft flights	___	___	___
• filming Hollywood movies	___	___	___
• equipment caches	___	___	___
• airstrips	___	___	___

ANSWER KEY

According to the Wilderness Act of 1964, check off what is allowed in wilderness:

	YES	NO	SOMETIMES	
• permanent roads			X	Usually not
• horses, mules, llamas, & goats	X			Almost always
• collecting antlers	X			Not commercial
• rock bolt climbing routes	X			Under study
• scientific research	X			
• noxious weed control	X			
• dams and water development structures			X	
• helicopter rescues	X			
• native fish stocking	X			
• cellular telephones	X			
• trail signs	X			
• logging		X		
• mining	X			Pre-existing claims
• oil & gas development	X			Pre-existing claims
• cattle grazing	X			Pre-existing claims
• motorbikes and four-wheelers			X	Rescues, ANILCA
• chainsaws			X	Fires, administrative
• hunting	X			Almost always, except NPS
• fishing	X			
• trapping	X			
• mountain bikes		X		By special order
• backpacking	X			
• historic cabins & lookouts	X			
• lightning-caused fires	X			If PNF plan meets prescription
• camping	X			
• dogs	X			Not NPS
• wheelchairs	X			
• snowmobiles		X		Except by special permit
• commercial outfitters	X			
• low level aircraft flights			X	
• filming Hollywood movies		X		
• equipment caches		X		
• airstrips		X		Unless pre-existing

Activity 1: Prohibitions and Conflicting Use in Wilderness
STUDENT/TEACHER HANDOUT

Why are motorized equipment & mechanical transport prohibited in Wilderness?
The Wilderness Act states that "there should be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanized transport." Where motorboat and aircraft use was established before a Wilderness was designated, the Wilderness Act, the Alaskan National Interest Lands Conservation Act, and other laws sometimes allow their continuation. Motorized wheel chairs are permitted in all Wilderness areas as long as they are suitable for indoor use.

The Wilderness Act makes exceptions for occasional use of motorized and mechanical equipment,"as necessary to meet minimum requirements for the administration of the area for the purpose of the Act (including measures required in emergencies involving the health and safety of persons within the area)." The exceptions might be for search and rescue, fire fighting, fish stocking where it occurred before the area was designated, certain grazing purposes when it occurred before designation, for some administrative purposes, and other similar reasons.

Why are some non-motorized devices such as hang gliders, parasails and bicycles not allowed in Wilderness?
Hang gliders and bicycles are considered mechanical transport which are prohibited by the Wilderness Act. Bicycles may add potential resource damage. All tend to intrude on the Wilderness "visual" experience of other visitors. The Wilderness Act recognized the Wilderness resource as a place that "...has outstanding opportunities for solitude." In most cases there are opportunities for these activities to take place outside of Wilderness.

What is the policy on aircraft flights over Wilderness?
There are restrictions for aircraft flights over Wilderness areas. The Federal Aviation Administration has issued a Notice to Pilots that a minimum altitude of 2,000 feet above the terrain (or above the uppermost rim of a canyon or valley) over Wilderness and National Parks be voluntarily observed by all aircraft. Boundaries of many Wilderness areas are marked on aeronautical maps produced by the National Aeronautics and Space Administration.

Activity 1: Prohibitions and Conflicting Use in Wilderness

STUDENT/TEACHER HANDOUT

continued:

How is grazing managed in Wilderness?

Where previously established, prior to the passage of the Wilderness Act, grazing is permitted to continue in Wilderness. Ranchers with grazing permits are required to maintain range conditions necessary to the livestock operation or the protection of the range through improvements, such as fences and watering facilities. The use of motorized equipment is permitted where it occurred prior to the establishment of Wilderness. Range management efforts such as fences and watering holes may be made when necessary to protect Wilderness values, and better manage the resource. Prescribed burning noxious weed control, seeding, irrigation, fertilization, and liming are allowed where the activity was practiced prior to Wilderness designation, when absolutely necessary for the grazing operation, and where there would be no serious adverse impacts on the Wilderness values.

Horses and pack stock used by commercial outfitters and private individuals are sometimes grazed under permit. These individuals must keep track of the area and amount of forage needed for their animals and are required to present annual reports to governing agencies. Feed must be packed in when forage is inadequate, and each Wilderness may set regulations on tethering horses, group size limits, and use of weed-seed-free-feed and pellets. Wild horses and burros are considered part of the natural system, where established at the time of designation.

Is mining allowed in Wilderness?

Effective January 1, 1984, the Wilderness Act withdrew minerals within lands designated as Wilderness from appropriation under the mining and mineral leasing laws, subject to valid existing rights. Holders of valid mineral leases retain the rights granted by the terms and conditions of the specific leases. Holders of valid mining claims are allowed to conduct operations necessary for the development, production, and processing of the mineral resource. Mechanized equipment, motorized access, and utility corridors may be developed. However, these activities and the reclamation of all disturbed lands must minimize the impact on the surrounding Wilderness character. Prior to designation as Wilderness, mining claims may be made on public lands administered by the Bureau of Land Management. Mining operations may continue after designation, subject to strict regulation to protect Wilderness characteristics.

How can private land owners get access to private land within Wilderness?

State and privately-owned land may occasionally become completely surrounded by Wilderness. Landowners retain adequate access to that land. If landowners are willing to sell and funds are available, the federal government may purchase such in-holdings. The land may, however, be exchanged for federally owned land of approximately equal value

Activity 1: Prohibitions and Conflicting Use in Wilderness
STUDENT/TEACHER HANDOUT

continued:

within the same state. The Alaska National Interest Lands Conservation Act (ANILCA) of 1980 contains special provisions for access to non-federal lands within Wilderness in Alaska which allow Native American traditional uses.

How are water resources managed in Wilderness?
Dams and water development structures, other than those necessary for range and wildlife, can only be authorized by the President. Existing reservoirs, ditches, water catchments and related facilities for the control or use of water can be maintained or reconstructed if they meet a public need or are part of a valid existing water right. Motorized equipment and mechanical transportation for maintenance of water development structure is allowed if the water resource project was in place before the area was designated as Wilderness.

AMERICAN HISTORY
Stewardship, Communication Arts, Speech/Debate

LESSON 11 • **Wilderness: A Way of Life**

Objectives:
Students will:

- understand the strong ties Native American cultures have with the environment/Wilderness.
- identify a variety of responsible land ethic practices that can be used in their everyday lives, in and out of Wilderness.
- identify a variety of connections between Native American cultures, their own cultures, and how these relate to stewardship of the environment/Wilderness.

Background:
In the growing, developed society we live in there has never been a time when we have become more removed from our environment. Our lives have become increasingly mechanized and controlled. Contrary to this reality, Native American cultures throughout the lower 48 states, Alaska, and Canada have fought to retain their strong ties with the land. Many of us can no longer make a connection between processed, neatly packaged food we purchase at the grocery story and the original source of that food. Many Native American cultures have successfully maintained a balance between their strong connection to the land and living in a modern society. This is not an easy balance to achieve as increasing demands for the extraction of natural resources face Native American communities.

Traditionally, many Native American cultures didn't understand the concept of owning land. They were taught to respect the Earth as they would respect their mother, for the land gave traditional peoples everything they needed to live happy and productive lives. Food, clothing, shelter, and spirituality were all available to an individual and a community if the proper respect and understanding of the connections between humans and the Earth was practiced. When a deer or bison was taken for food, something was given back such as a prayer or a sacred song. Something was offered in return so the balance and harmony of the people and their environment was not upset. Waste of natural items such as meat or hides was never practiced as the people understood they should only take what was needed so there would be gifts of life for them in the future.

The word "wilderness" is not present in many of the indigenous languages of North America. All of the components of wilderness had their own words. Wilderness was their home. It was their place of worship and it was the base for their cultural and spiritual development and stability.

This lesson plan is designed to allow students to explore and understand the reverence and connections traditional and contemporary Native American cultures have with the Earth, and will instill in students the urgency in maintaining a balance between humans and their environment.

Activity 1: All Things are Connected

Materials:

- video: "All Things Are Connected"
- "The Land is Sacred Teacher's Guide"

Duration: 15 minutes for the video, 40 minutes for exercise

Location: classroom

Procedure:

1. Ask students how many of them have read books such as *Bury My Heart* at Wounded Knee, Black Elk Speaks, or Touch the Earth. Ask students what kind of connection they feel the original inhabitants had with their environment? Emphasize that there are strong connections between traditional and contemporary Native Americans and the land.
2. Present the video.
3. Follow the video by facilitating activities from the teacher's guide "The Land is Sacred."
4. Conclude the session by emphasizing the point that just as traditional tribes had a close relationship with the land, the same bond is as important to modern Native cultures as it was to their ancestors centuries ago. In fact, it has become even more vital for contemporary Indian peoples to maintain a very close relationship with the land. Contemporary cultures in many cases do not live directly off the land and their lives are constantly influenced by non-Indian, or non-environmentally aware societies.

Activity 2: Native American Storytelling

Materials:

- "Keepers of the Earth" Teacher Guide
- paper and pen
- chalkboard

Duration: 1 class period

Location: indoors or outdoors

Procedure:

1. If possible, arrange for a local Native American storyteller to visit your class or read one or two stories related to a tribal group closest to your area from "Keepers of the Earth". If a Native American storyteller is not available, please refrain from telling stories found in books or magazines as Native Americans should be the ones to tell their own stories. The books listed in this activity are already approved for educational purposes and cover a spectrum of geographical tribal areas.
2. Inform the students that a great deal of traditional tribal history and culture was passed down through generations orally. Relating actual experiences as well as myths and legends through storytelling was used by most tribes to teach the children about their heritage and about everyday life.
3. Introduce the Native American storyteller by name and tribe.
4. After the storytelling session, ask each student to list four things that traditional Native American people relied on nature to provide. List student ideas on the chalkboard.
5. Conclude the activity with a group discussion on how Native Americans historically and today rely on the environment. Discuss how these same concepts relate to contemporary environmental awareness and responsibility for us all.

LESSON 12 • **Looking Into the Future**

Objectives:
Students will:

- evaluate recreational demands on Wilderness.
- develop potential management solutions.

Background:
In 1979 the Confederated Salish and Kootenai Tribes (CSKT) on the Flathead Indian Reservation in Montana set aside 89,500 acres of privately owned tribal lands along the western slopes of the Mission Mountains as wilderness—the first such wilderness dedicated by any tribe. In many ways, management of the tribal wilderness was patterned after the federal Wilderness Act of 1964. For example, timber harvest, roads and motorized vehicles are not allowed. But this is a wilderness set aside on terms determined solely by the tribe—not by the federal government or any other outside agency. Only tribal members are allowed to hunt within the wilderness, maintaining both a food source and a cultural tie. A common theme of management is the tribe's spiritual links to Wilderness.

We'll now move into the future. . . It is the year 2050. Confederated Salish and Kootenai Tribal Complex offices are located in Pablo, Montana where wilderness managers work. There are six high rise buildings located at the office complex . The town has grown to support a population of 250,000 people. More and more people are spending time in wilderness. Due to increased use, the budget for the CSKT Wildlands Recreation Program is $1,500,000.00 and impacts have escalated, threatening the wilderness resource.

Two proposals put forth to the Tribal Council for consideration:

1. All allowable timber harvest has taken place on adjacent national forest lands. The Flathead Reservation contains the only remaining stands of a potential timber base available for harvest. Because of the scarcity of potential timber, a group of people have suggested that the wilderness designation of the Mission Mountains Tribal Wilderness be rescinded. These individuals prefer a multiple use management scheme where natural resources are utilized to meet the general public needs for timber, water, and recreation. Some recreationists in this group want to expand the tourism opportunities by constructing a high alpine, all-season destination lodge on McDonald Peak, within the Wilderness, with guided hiking, skiing, hunting, and fishing trips. Some people in the group are proposing a road system be built to access many of the high mountain lakes where campgrounds would be constructed to accommodate this type of recreational use. By removing the Wilderness designation of the Mission Mountains, more people could use the area for a greater variety of recreational experiences, access would be improved, and humanity could benefit from natural resource extraction and development.

Background continued:

2. There is also an increased number of people who want to see the tribal wilderness left alone in order to restore human impacts and to give wildlife populations a chance to recover. This organized group of private citizens and conservation groups feel we have lost the wild character of this wilderness because it has been "loved to death" and does not meet the criteria of wildlands any longer. The group suggests a ten year moratorium on human use of the tribal wilderness. They believe this time frame will allow adequate time to give impacted campsites and lake shores time to regenerate and will provide an undisturbed environment for the remaining grizzly bear population to recover. They also are proposing a ban on any recreation activities in the wilderness during the ten year time frame. To ease the transition between wilderness lands and adjacent land that is managed in a multiple use scheme, this group proposes that a buffer zone of one mile be established around the boundary of the wilderness. **TWO** proposals are being presented to the Tribal Council for their consideration.

Activity 1: Wilderness Management Dilemma

Materials:

- role playing descriptions, pages 276-277.

Duration:

2 to 3 class periods, depending on whether time out of class is used to develop position papers, conduct personal interviews, and write essays

Location: classroom

Procedure:

1. Provide students with background information. Generate an initial discussion about some of the management dilemmas facing tribal wilderness managers. Copy the role descriptions and cut them apart to pass out to students. Create any additional roles that serve to illustrate a variety of major perspectives and interests.

2. Ask each student to choose an individual they wish to represent for this activity—or assign roles randomly. Three members of the group will role play tribal council members. They will hear testimony from individuals representing these two proposals. The remaining students will assume the role of an individual who will testify before the council. Individuals representing strong preservationist points of view should define their positions clearly, as should individuals representing economic interests and concerns about changing the status of the tribal wilderness. The roles have conflicting values and concerns relating to the potential impacts of these two proposals. Each presentation will be limited to five minutes.

Procedure continued:

3. Ask students to prepare for their role and develop a short position paper for use as background for their roles. Ask students to interview people in their community or research the role they represent. Students may dress for their roles to heighten the emotional quality of the experience.

4. Arrange the classroom to represent a meeting room for the Tribal Council. Students will role-play their position and make presentations to the Tribal Council.

5. After students make their presentations, ask the Tribal Council to make a decision on what changes, if any, will be made to the existing Wilderness management plan for the Mission Mountains Tribal Wilderness.

6. Following the CSKT council's decision, have a brief class discussion to summarize the issues that emerged from the student's presentations. Identify and list the "pros" and "cons" of each option. What made some students more persuasive in their presentations than others?

7. After the role play and discussion, ask each student to write a brief essay describing his or her own personal recommendations for managing the wilderness.

Evaluation / Follow-up / Extensions:

- Evaluate position papers, role presentations, class discussion, and final essays.
- Discuss potential positive and negative effects on a variety of different kinds of plants and wildlife under each proposal.
- Students can identify a local natural resource issue to pursue for further study.
- Students can plan a forum, inviting local representatives involved in the issue to share their viewpoints. Students can design questions and evaluation criteria for the forum.

Career Options:

- Students can research career options of various roles portrayed during the simulated council meeting.

References:

- Adapted from Aquatic Project WILD Activity, "To Dam or Not to Dam"

AMERICAN HISTORY
Stewardship, Communication Arts, Speech/Debate

ROLE PLAYING DESCRIPTIONS

1. Three people chosen as members of the Tribal Council.
2. **Ira Gation:** a representative of the local ranchers' coalition interested in developing additional irrigation opportunities.
3. **Bob or Betty Backpacker** concerned about the lack of solitude in their favorite camping spots in the wilderness.
4. **Bill "Bull" Trout:** a local angler concerned about the deterioration of the fishing opportunities in the wilderness.
5. **Nate Eve Critters:** the president of the "Save Our Native Plants and Wild Animals" organization.
6. **Tim Burr:** the owner of a lumber mill whose livelihood depends on the availability of trees to harvest.
7. **Max-a-million:** an out-of-state developer who has architects working on designs for lake side condominiums and all-season lodges, who also hopes to offer guided hiking, skiing, fishing, and hunting expeditions.
8. **Windy Surfer:** an avid sail boarder who sees the road access to the high mountain lakes as a real boon to surfing interests.
9. **Catch N. Release:** a long-time resident who champions the purity of fly fishing and insists on pristine habitat.
10. **Ken U. Boat:** an older angler who enjoys throwing the boat on the top of the car and putting in at a float spot—especially alpine lakes!
11. **Cy N. Tist:** a respected biologist who is prepared to testify about the potential effects on wildlife if the Mission Mountains Wilderness is removed from official wilderness status.
12. **E. Conomy:** a local businessperson who is concerned about the long-range business potential of the area.
13. **I. M. Packin':** a local outfitter who guides people on hunting and fishing trips in the wilderness.
14. **Captain Campout:** a long time user of the wilderness who has personally witnessed the loss of wilderness values—"things just ain't what they used to be........."

ROLE PLAYING DESCRIPTIONS continued:

15. **Wilderness Wilma:** wilderness activist who has led the fight to protect old growth forests and threatened and endangered species.

16. **Old Bear:** a tribal elder who has used the wilderness for traditional purposes throughout his/her life.

17. **Grey N. Old:** a local representative of the Gray Panthers, a group of retired people who are concerned about access to recreational areas where they can camp with their RV's.

18. **Monty Motorhead:** leader of loosely organized group of off road vehicles (ORV) users who want an increase in motorized use on reservation lands.

19. **Forest or Park Site:** a trained forester who has worked in the woods in the adjacent national forests for 30 years.

20. **Arch E. Ologist:** an archeology professor from the local university who has done extensive research on the archaeological sites of Indian camps in the tribal wilderness.

21. **Ranger Rick or Ramona:** wilderness ranger in the Mission Mountains Tribal Wilderness for the past ten years who is concerned about the spread of noxious weeds, human impacts, and the dwindling grizzly bear population.

ENGLISH

LESSON 1 • **Rewriting the Wilderness Act**

Objectives:
Students will:
- Read the Wilderness Act of 1964 and rewrite phrases in their own words.

Duration: 1 to 2 class periods

Location: indoors or outdoors

Background:
Passed by Congress in 1964, this Act has tremendous ramifications for natural resource use in the United States. This activity introduces phrases of the Act for students to put into their own words.

Activity 1: Rewriting the Wilderness Act

Materials:
- Wilderness Act in "Wilderness: An Overview" section, pages 46-53.
- Wilderness cards, page 281 or use laminated cards from Wilderness Box
- dictionary
- paper, pencil or pen
- chalkboard
- butcher paper or flip chart
- video: "Wild By Law"
- student handout discussion questions: "Wild by Law", page 282.

Procedure:
1. Divide students into small working groups of two to three per group. Make copies of the Wilderness Act from the "Wilderness: An Overview" section, page 46. Distribute one copy of the Wilderness Act handout [Section 2 (a) and (c)] to each group. Ask students to read the Act out loud.

2. Make phrase cards and pass out one phrase card to each group. Encourage students to look up words in the cards they do not understand. Ask student groups to read each phrase card, discuss with each other what the phrase means and rewrite it in their own words. Allow 15 minutes for each group to describe their particular phrase.

3. Ask each group to first present their phrase cards, then share their new versions. Do this in numerical order.

4. Record the new versions in order on the chalk board or on butcher paper.

ENGLISH
American Government

Procedure continued:

5. Each student will use the new phrases from the group exercise and create a new version of the Wilderness Act, adding connecting words and sentence structure.

6. Watch the "Wild By Law" video and assign as a group discussion or as an individual assignment the "Wild By Law" discussion questions, page 282. Video length is one hour, so you may want to break it into segments. Provide copies of the discussion questions so the students know what to look for. Encourage students to take notes during the video.

Evaluation / Follow-up / Extension

- Evaluate the final draft of Wilderness Act rewrite.
- Evaluate the student responses to the "Wild By Law" discussion questions.

Career Options:

nature writer, technical writer, policy maker, Wilderness manager

Activity: Rewriting the Wilderness Act

WILDERNESS ACT PHRASE CARDS

- Opportunities for Solitude
- No Mechanized or Motorized Vehicles are allowed
- To Insure that Humans Do Not Occupy or Modify All Areas of the U.S.
- For Future Use and Enjoyment as Wilderness
- For Present and Future Generations
- Untrammelled by Humans
- A Visitor That Does Not Remain
- Designated by Congress
- Affected Primarily by the Forces of Nature
- Enduring Resource of Wilderness
- In Contrast with Areas where Humans Dominate the Landscape
- Primeval Character and Influence
- Not Modified By Humans
- Ecological Value
- Preservation
- Where the Imprint of Humans is Substantially Unnoticable
- Wilderness Character
- National Wilderness Preservation System
- Without Permanent Improvements or Human Habitation
- Natural Condition

STUDENT HANDOUT
Wild by Law Discussion Questions

1. Who were the three men who fought for the National Wilderness Preservation System?
2. Describe what symbolic & physical effects the automobile had on Wilderness.
3. What is the thing Americans did that no other country had ever done?
4. What did the 20th century provide, in the name of progress, for the average American citizen?
5. Describe Aldo Leopold's professional and personal life. Explain how Aldo Leopold's attitudes toward wildlife changed.
6. Name the first official Wilderness area in the United States. When did this happen?
7. What was Bob Marshall's answer to the question: How many Wilderness areas do we need?
8. In one paragraph each, describe Bob Marshall, Aldo Leopold, Howard Zahniser. What did they all share in common? What were their unique contributions for wilderness?
9. What did the "Dust Bowl" years teach people? How did these attributes affect wilderness?
10. What was the greatest threat to wilderness after the Depression?
11. Why do you think *A Sand Country Almanac* is such an important book?
12. What was the wilderness movement of the 20th century about?
13. By 1950, how many conservation organizations were there in America? What were their concerns regarding wilderness?
14. Explain the controversy and history of Dinosaur National Monument. What did the controversy have in common with Hetch Hetchy in the Yosemite Valley?
15. How long did it take to pass the Wilderness Act? How many versions of the bill were there before one passed? How many congressional hearings were held?
16. What is the National Wilderness Preservation System? What acreage and percentage of the land base in America is currently designated Wilderness?
17. Will America ever be done with the debate over how much land to protect? To develop? Explain your answer.
18. Describe in one paragraph how you felt when you heard the wolf howl.

TEACHER HANDOUT: Answer Key
***Wild By Law* Discussion Questions**

1. Who were the three men who fought to save 90 million acres of Wilderness?
Response: Aldo Leopold, Bob Marshall, and Howard Zahniser

2. Describe what symbolic & physical effects the automobile had on Wilderness?
Possible Response: The automobile was a symbol of freedom and progress. It made the Wilderness accessible. Roads brought people—tourists, loggers, miners, and builders. Cars and roads took people to see the country. Answers may vary.

3. What is the thing American did that no other country had ever done ?
Possible Response: It passed a law to protect its last remnants of wild land forever.

4. What did the twentieth century provide, in the name of progress, for the average American citizen?
Response: A vote, the national anthem, a bank account, and a high opinion of himself/herself.

5. Describe Aido Leopold's professional and personal life. Explain how Aldo Leopold's attitudes toward wildlife changed.
Possible Response: Aldo Leopold was a forester who saw his job as one of "managing" the wilderness. He initially felt fewer wolves would mean more deer; meaning no wolves would provide a hunter's paradise. After watching the green fire die in the wolves' eyes, he sensed that neither the wolf nor the mountain agreed with such a view. (Over the years he watched wolves hunted down, and deer multiply, then weaken and die.) He came to the conclusion that the highest use for this land is no use at all. We need to set certain corners of the Earth aside as Wilderness.

6. Name the first official Wilderness area in the United States. When did this happen?
Response: The Gila Wilderness, in 1924. It represents deserts and ancient cliff dwellings.

7. What was Bob Marshall's answer to the question, How many Wilderness areas do we need?
Response: He answered, "How many Brahm's symphonies do we need?"

8. In one paragraph each: Describe Bob Marshall, Aldo Leopold, Howard Zahniser.
What did they all share in common? What were their unique contributions for Wilderness?
Possible Response: Aldo Leopold was a thinker, a scientist, a family man; a forester, turned philosopher. Bob Marshall was a wealthy man; a millionaire turned socialist, an adventurer who liked to hike and count things; and an exuberant mountain man. Howard Zahniser was a tireless bureaucrat who possessed a love for wild places he seldom saw. All three men were passionate that something was being lost, something sacred, something important was vanishing.

TEACHER HANDOUT: Answer Key
Wild By Law Discussion Questions

9. What did the "Dust Bowl" years teach people? How did these attitudes effect Wilderness?
Possible Response: One-third of the nation's topsoil had blown away. Something had gone awry-a bulldozer mentality. It taught people how scientific knowledge, expertise, and technology could be misused and misapplied. We've not always been prudent. We need to reexamine our thinking and ways of doing.

10. What was the greatest threat to Wilderness after the Depression?
Possible Response: Tourism. The wilderness was in danger of being "loved to death". We built an expanding web of roads through the national parks.

11. Why do you think *A Sand County Almanac* is such an important book?
Possible Response: The book says things people feel deep in their hearts but don't know how to say. It provides a sense of relationship to the land, the morality of people relative to other species, and the importance of beauty.

12. What was the Wilderness movement of the 20th century about?
Response: It was about restraining urban, industrialism and redefining progress and development.

13. By 1950, how many conservation organizations were there in America?
What were there concerns regarding Wilderness?
Response: 300 organizations. Wilderness preservation had become a national crusade.

14. Explain the controversy and history of Dinosaur National Monument.
What did the controversy have in common with Hetch Hetchy in the Yosemite Valley?
Possible Response: The Dinosaur National Monument was designated to protect a wild canyon from being dammed. Conservation groups urged people to float the Green River to see what would be destroyed. The public feared that what had happened with the damming of Hetch Hetchy in Yosemite National Park would happen here. They didn't want to repeat this disaster. Preservationists won a national battle for Wilderness and against developments in national parks.

15. How long did it take to pass the Wilderness Act? How many versions of the bill were there before one passed? How many Congressional hearings were held?
Response: Howard Zahniser spent 8 years lobbying for the passage of the Wilderness Act. He saw 66 bills through rewrites, and spoke at all 18 congressional hearings around the country.

16. What is the National Wilderness Preservation System (NWPS)? What acreage and percentage of the land base in America is currently designated as Wilderness?
Possible Response: Zahniser's solution was to create a NWPS, giving Congress power to designate permanent Wilderness areas. 9 million acres were preserved as NWPS in 25 years. The system contains nearly 104 million acres, or 4 percent of the country.

TEACHER HANDOUT: Answer Key
***Wild By Law* Discussion Questions**

17. Will Americans ever be done with the debate over how much land to protect? To develop? Explain your answer.
Possible Response: Answers may vary. People argued for a redefinition of progress. They wanted America to change its mind. Saving the last vast tracts of wildlands was a new way of understanding the world and seeing the wildness in small things.

18. Describe in one paragraph how you felt when you heard the wolf howl.
Possible Response: Answers may vary!

ENGLISH
Literature: American History

LESSON 2 · Wilderness Literature

Objectives:
Students will:

- identify an author's relationship with nature and the use of "story" to communicate this relationship.
- examine the intrinsic values of wilderness and the relationship between civilization and wilderness.

Background:
You will find a small sampling of wilderness-related literature in the Wilderness Reader. There is a wealth of writing on the subject of wilderness. Often times the author draws connections between wilderness and civilization. The following activities are designed to expose students to authors associated with wilderness and their relationship to it. In Activity 1 students will select one of the readings, conduct background research on the author, and respond to discussion questions. In Activity 2 students will understand Edward Abbey's arguments for preservation of land as Wilderness. In Activity 3 students will understand Gary Snyder's view of wilderness and our culture's need and relationship for wilderness.

Activity 1: The Power of Literature

Materials:

- Wilderness Reader: "Christmas in Driftwood Valley," Theodora Stanwell-Fletcher; "Refuge," Terry Tempest Williams; "At Lobo Lake," Margaret Murie; "Okefinokee Swamp, Georgia," Harvey Broome.
- Teacher handout: "Discussion Questions", pages 289-292.

Duration: 1 to 2 class periods, possible homework

Location: indoors or outdoors

Procedure:
1. Students will select one piece from the collection to read and respond to questions from the teacher handout, pages 289-292.
2. Ask students to read the introduction to each story about the author's life experience (if it is available).
3. After reading the selected piece students will research the author's life and how life experiences affected their writing.

Procedure continued:
4. Students will answer questions by leading a discussion on the reading or as a writing assignment. If a class discussion is held, the student should be prepared to provide a summary of the story before leading a class discussion of the questions posed. Presentations can take on the form of individual presentations or as a panel of several students comparing and contrasting different authors' works.

Activity 2: Freedom and Wilderness

Materials:
- Wilderness Reader: "Freedom and Wilderness, Wilderness and Freedom," Edward Abbey

Duration: 1 class period, possible homework

Location: indoors or outdoors

Procedure:
1. Assign the essay from the "Wilderness Reader."
2. Use the following questions as topics for discussion:
   - Why does Abbey consider Hoboken, New Jersey or Central Park, New York as wilderness?
   - What is the first reason Abbey gives for needing wilderness?
   - Have students find one of Abbey's arguments they don't believe or understand; have them debate against Abbey on that reason.
   - Why can't we have freedom without wilderness?
   - Explore the metaphor of the mountain lion in Abbey's story. What values does the mountain lion represent for wilderness and our human relationship with wilderness?

Activity 3: The Etiquette of Freedom

Materials:
- Wilderness Reader: "The Etiquette of Freedom," Gary Snyder

Duration: 1 class period, possible homework

Location: indoors or outdoors

ENGLISH
Literature: American History

Procedure:

1. Have students read the essay. Have them focus on the sections, the words "nature," "wild and wilderness," "wildness" and the word "watching." This is advanced reading, but enforce the fact that students should try to get what they can from it.
2. Assign discussion questions to guide student reading.

   Discussion questions:

   - What point is Snyder making by defining wilderness in positive verbs and nouns?
   - What is the relationship between civilization and wilderness? How does this differ from Abbey's thoughts on wilderness and civilization?
   - What has been the relationship between wilderness and American culture?
   - Are humans wild?
   - What does Snyder mean by "the world is watching?"
   - What does the wild require of us? How then can we respect the wild?

Evaluation / Follow-up / Extension

- Evaluate responses to discussion questions, either in written form or in oral presentations. Students should be encouraged to apply original thinking to their responses.
- Ask students to answer the following questions: Have conditions changed since the selected piece was written? Would your recognition of these changes alter your opinion of the pioneers?
- Encourage students to read other works by these authors. See references section for additional reading opportunities.

Career Options:
nature writer, naturalist, wildlife biologist, Wilderness ranger, researcher

References:

- Theodora Stanwell-Fletcher, "Christmas in Driftwood Valley," from *Sisters of the Earth*
- Terry Tempest Williams, *Refuge*
- Margaret Murie, "At Lobo Lake" from *Words for the Wild* or *Two in the Far North*
- Ed Abbey, "Freedom and Wilderness, Wilderness and Freedom" from *The Journey Home*
- Gary Snyder, "The Etiquette of Freedom" from *The Practice of the Wild*
- Harvey Broome, "Okefinokee Swamp," from *Faces of the Wilderness.*

Activity 1: The Power of Literature

TEACHER HANDOUT • Discussion Questions

Theodora Stanwell-Fletcher, "Christmas in Driftwood Valley"

1. Describe the relationship the author has with nature. How does the author's use of "story" communicate this relationship?

Possible response:
The author describes how she and her husband spent Christmas day in a remote wilderness setting. She uses the wilderness setting to set her story apart from other stories of Christmas by describing what it's like to wake up in the morning to subzero temperatures, and how the day begins as a special day, Christmas. With humor, she describes what it's like at -50 degrees, "I poured a stream from the teakettle onto the snow outside, the water steamed and twisted into threads, but did not turn actually solid till it reached the ground. We must put out our unused thermometer whose scale goes to 60 below." She describes how her "furred and feathered friends" cope with the cold temperatures while pondering how these animals have adapted to such a climate. She accurately portrays a vivid picture of the twinkling brilliance, the unsullied whiteness, the intense pureness of the air on her snowshoe trek of the day. Best of all is her description of "the moment of white twilight which comes on a particularly clear afternoon". The reader may get the impression that Stanwell would not want to live anywhere else.

2. What are the other influences, both internal and external, affecting the author's relationship with nature?

Possible response:
The author writes about living with her husband in a remote area in British Columbia, Canada, in the late 1930's and early 1940's. Not only is the location remote, the winters are long, daylight hours are short, and temperatures are very cold. Fletcher is living a simple life which along with these other factors contributes to a deeper appreciation and enhancement of her natural surroundings. She describes it as, "the ultimate perfection of purity and peace." Even though it is 36 below zero, she is out snowshoeing, observing the color of the sky, the changing colors as the day begins and ends. It is Christmas and she asks the question, "Have we greatly missed the things that make Christmas Day in civilization?" Standwell answers the question by describing her "deep contentment of our healthy minds and bodies, by our closeness to and awareness of the Earth, and of each other."

3. Conduct research on the author's life. Describe how spiritual, cultural, and emotional ties to nature influenced her writing.

Possible response:
Answers may vary.

Activity 1: The Power of Literature

TEACHER HANDOUT • **Discussion Questions**

Terry Tempest Williams, "Refuge"

1. Describe the relationship the author has with nature. How does the author's use of "story" communicate this relationship?

Possible response:
The author slips and is injured in the backcountry. She faces the reality of dealing with such a life-threatening event happening in a relatively remote location. She questions whether she will survive the injury and if she is capable of getting herself out. She says, "I have been marked by the desert. The scar meanders down the center of my forehead like a red, clay river. A natural feature on a map. I see the land and myself in context." Williams accepts the element of risk in entering wilderness—"where one's character will be shaped by the landscape." Despite the injury, she will return to this place describing it as "the sheer beauty that calls us back again and again."

2. What are the other influences, both internal and external, affecting the author's relationship with nature?

Possible response:

Answers may vary.

3. Conduct research on the author's life. Describe how spiritual, cultural, and emotional ties to nature influenced her writing.

Possible response:

Answers may vary.

Activity 1: The Power of Literature

TEACHER HANDOUT • **Discussion Questions**

Margaret Murie, "At Lobo Lake"
from *Words for the Wild* or *Two in the Far North*

1. Describe the relationship the author has with nature. How does the author's use of "story" communicate this relationship?

Possible response:
In 1956 Margaret Murie is conducting wildlife research in a remote area in the Alaskan tundra. With only the bare necessities, she and three other environmental scientists spend a summer conducting their field research. Each evening the four researchers compare notes, sharing their story, or day's experience, with the others. Each person brings a different perception into their story based on their background and reasons for being there. Most of the author's work involves difficult cross country travel over muskeg tussocks, lots of mosquitoes, and very primitive living conditions. The lack of modern conveniences is a trade-off for the close connection she has with the Arctic wilderness and wildlife inhabiting this land. Regarding wildlife she studies and observes, she states, "This was their world. We were the fortunate visitors." She is very appreciative of this experience and sees the importance of this wild place remaining remote and relatively inaccessible. If mapped and made more easily accessible, she asks, "would wilderness be compromised and civilized?" She is able to offer potential solutions to accommodate people in wilderness without compromising wildness.

2. What other influences, both internal and external, affect the author's relationship with nature?

Possible response:
Margaret Murie is married to Olaus Murie, a wildlife biologist. Together they work as a field research team. Margaret's attitude toward her work, her partner, and her surroundings is an exemplary model of a woman's life in the wilderness. She has a positive, and sometimes humorous, ability to describe the daily events of her work and her surroundings. The author had a visionary ability to be concerned with the remote reaches of Alaskan wilderness losing their wild character if civilization and a growing population were to discover it. Thus, the author and her husband were champions of establishing the Arctic National Wildlife Refuge.

3. Conduct research on the author's life. Describe how spiritual, cultural, and emotional ties to nature influenced her writing.

Activity 1: The Power of Literature

TEACHER HANDOUT • **Okefinokee Swamp, Georgia**

Harvey Broome, "Okefinokee Swamp"
from *Faces of the Wilderness*

1. Describe the relationship the author has with nature. How does the author's use of story communicate this relationship?

Possible Response:
The author is not afraid of nature. He mentions how few poisonous snakes there are; the dark hanging moss, the dense, marshy wetlands, and the mosquitoes are not a problem. Primarily he tells us about the wild landscape—the lay of the land, the habitat types, and the diverse wildlife. He guides us, through his words, on a nature trip.

2. What are the influences, both internal and external, affecting the author's relationship with nature?

Possible Response:
Internally he is deeply moved by this country. He sums his Wilderness experience with these words, "Here was a mystery we could not penetrate in a day or a week. Here was the climax forest, a paradox of land that submerged into water and of water that merged into land, an insoluble world of 'trembling earth,' of inexhaustible life, and of soul-stirring loveliness."

Externally he exclaims that "at one time the swamp contained the greatest cypresses in America, huge giants eight feet and more in diameter... The moist world of cypresses and Spanish moss, of whooping cranes and alligator... the ivory-billed woodpecker is extinct, and at present there is some poaching. The 'gators' are suffering most. There were islands, lakes, the unique 'prairies,' streams and runs as well as dense forest 'growing right out of the water.' The sudden glimpse of the unruffled surface and exquisite reflections of one of these lakes, as one emerged unexpectedly from a run, was an unforgettable experience." He observes ibises, egrets, great blue herons, ospreys, and others.

3. Conduct research on the author's life. Describe how spiritual, cultural, and emotional ties to nature influenced his writing.

Possible Response:
Answers may vary. Harvey Broome was one of the eight organizers of The Wilderness Society in 1935. He was a member of the governing council from the beginning, became vice president in 1948, and president in 1957. He was a man of spirit who found renewal hiking and packing in the backcountry. He was firmly committed to Wilderness preservation, working year after year to advance the education process which ultimately led to the creation of the National Wilderness Preservation System. This story was taken from his journals (Broome, 1972). The Okefinokee National Wildlife Refuge is part of the National Wilderness preservation System, managed by the U.S. National Wildlife Service in the state of Georgia.

ENGLISH
Research

LESSON 3 • Contemporary Role Models in Wilderness and Land Ethics

Objectives:
Students will:

- use interviewing skills to describe the importance of the accomplishments of local people who have contributed to conserving or preserving wild places or wildlife.

Duration:
One week of class time, 45 minutes to one hour per day, plus time out-of-class to interview people in the community.

Location: classroom and in the community

Background:
Our society selects role models from many different professions and walks of life. These people come from sports, movies, television, politics, literature, religion, or other places. With increasing problems and challenges like the dramatic rise in human population, urbanization, habitat loss, pollution, and loss of plant and animal species, some people are concerned about the preservation of wild places and wild animals. These people are called environmentalists, preservationists, conservationists, or wilderness advocates. These concerned citizens look to role models in fields such as science, technology, ecology, archaeology, anthropology, literature, or government for guidance and inspiration. Students can benefit from learning about leaders who make a difference by attempting to create a better world through their land ethics.

Contemporary role models can be identified by their actions in the community or local region. While we recognize the efforts of people like Bob Marshall and Aldo Leopold for their contributions to Wilderness, wildlife, and land ethics, contemporary role models don't have to achieve national or international acclaim. There are people all around us who work tirelessly, year after year, to contribute to the quality of life in their communities. These people may not be famous or well known in the major media at national or international levels.

Students will develop an increased understanding of character attributes required of an effective advocate for stewardship and land ethics. Role models from local communities or regions can serve as role models for students reinforcing the idea that students can make a difference on behalf of wild places and animals.

Activity 1: Contemporary Role Models in Wilderness and Land Ethics

Materials:

- resource materials
- student handout: “Guidelines for Interviewing People,” page 296.
- Wilderness Reader: “Wildland Activism in Montana, A Long and Proud Tradition”

Procedure:

1. Introduce the activity by explaining that the students will be doing first hand biographical research on people in their own community, state, or region (local heroes and heroines). Ask students to come up with a definition of an environmental hero or heroine.

2. In small groups or as a class, come up with ideas for sources of information that could be used to find out about people in the community who have contributed to conserving or preserving wild places or wildlife. Examples might include: public library and librarians, school library, city hall, government offices, telephone book, local or regional newspapers and magazines, local chapters of conservation or environmental organizations like Audubon, Sierra Club, wilderness or wildlife societies, reporters or editors on staff of local or regional papers, or local or regional television news directors. The class might consider placing an advertisement in the paper or enlist the help of a reporter to write up a story on the class project.

3. Once a list of names has been generated, students in groups of three or four should select a name from the list. Each group will now become a biographical research team to prepare a biography or living history of the person. In some cases the suggested name may be that of a person who was important in the community as a conservationist, but who is now deceased. Then the team will have to find relatives, friends, former employers, and other potential sources of second hand information to interview.

4. Each team should make a research plan. This should include the outline of any interviews they may want to conduct, either with the person directly or with others who know or knew them. Each team's plan should be discussed with the class and suggestions for improvement considered. After the plans have been discussed and refined, the teams should make contact with the people they want to meet and interview. This should be done using a letter, stating the purpose of their research and suggesting that they follow the letter with a personal contact by telephone.

5. When teams have confirmed the willingness of people to be interviewed, they should meet with them and conduct the interviews. The basic interview format should include any personal history details of note. Questions might include:

   - How did you become interested in Wilderness, wild places, or wildlife?
   - What prompted you to take action?
   - What difficulties did you encounter and how did you overcome them?
   - What do you think your contribution has been?
   - What are your personal dreams and goals for wild lands?
   - What would your advice be to citizens wanting to take positive action to protect and preserve wild places and wildlife?

Encourage students to include their own personal interests and to reflect particular circumstances.

Procedure continued:

6. After completing interviews and additional research as needed, each team should write a biography about their person. Once completed, each team should share their information with the class. Ask students to also make copies of the biographies and send each biography with a letter of thanks to the people who were interviewed and others who assisted.

Evaluation / Follow-up / Extension

- Grade students on small group process skills, research skills, interviewing techniques, research paper, follow up, and reporting to the class.
- Create a visual display of completed biographies, complete with photographs and news articles. Invite local heroes and heroines to school for public recognition of their contributions. Present copies of biographies and letters of thanks at this time. Invite the news media to cover such a ceremony and celebration.
- Develop a computer database of the people who were identified in your study, including information you discovered and the names of local contact people who assisted with the study.
- Present a copy of the biographical reports to the school library.
- Write a position paper on the student's views and approach to the assignment.

Career Options:

nature writer, naturalist, artist, politician, environmental activist, playwright, natural resource professional, religious or spiritual leader, environmental educator, teacher, outdoor photographer.

References:

- Aquatic Project WILD, "Living Research: Aquatic Heroes and Heroines."

Lesson: Contemporary Role Models in Wilderness & Land Ethics

STUDENT HANDOUT

Guidelines for Interviewing People

To some extent, everyone in a community is an expert on something. Perhaps your students will want to know what something in the community looked like 20 or 40 years ago. They may want to speak with some long term residents. An interview can provide a powerful piece of oral history—or it can be an intrusion into the life and privacy of a person. If students are sent out to interview people, some guidelines are useful.

Students should have an introductory letter on school stationery explaining what they are doing, who they are, and asking for cooperation and assistance—with thanks in advance.

Interviews should be planned in advance, at least in terms of outlining major questions to be asked. Students should be taught to conduct a professional interview and to keep the interview focused on the purposes of the research. For example, students should listen and record their subject's responses. Rather than the students using the time of the interview to expound their own views on the topic, their task is to learn the subject's views. The subject should at all times be treated with dignity and respect. If any form of recording is desired, the people being interviewed should be asked in advance for their permission and should be told how the information will be used. If you want to quote the person being interviewed by name, then the person should be given the opportunity to see the written proceedings of the interview, review any excerpts to be used, or review the recording before any class or public use of the information takes place. If any public opinion surveys or other forms of interviews in public places are planned, students should be supervised by adult helpers. People who might be concerned (shop keepers, mall managers, etc.) should be asked in advance and informed about the project and its purposes. If people do not want to be interviewed, thank them politely for their time and let them proceed with their business. As a general principle, it is recommended that any interviews to be conducted by students be arranged in advance by their teacher. An in-class trial run or practice session using role-playing techniques with students serving as constructive critics of their performances can be effective preparation for actually conducting interviews.

Credit: Aquatic Project WILD, "Living Research: Aquatic Heroes and Heroines"

LESSON 4 • Reflections on Wild Places— A Journal-Making Activity

Objectives:
Students will:

- produce a journal-like collection of items and written entries that reflects on their feelings about "natural things" and "wild places."
- express in writing at least one value they see in preservation of a wild place.

Background:
Journals have been kept by countless people throughout history. A journal is a tool for capturing thoughts, ideas, reflections, images, and feelings. Many naturalists have kept journals as they traveled and studied their environment. These journals are not limited to written entries of empirical data, but contain snatches of ideas, sketches, poems, even bits and pieces of an experience. Keeping a journal allows us to capture a moment or idea before it escapes us, gives us a chance to take a second look. A journal is a tool to help train all of our senses, to make us better observers. A journal is a record of ideas and information that may later give insight or answers to things we question or are curious about.

Journals can be creative; they can be factual; the best seem to be a combination of both. A log or diary is a journal, so is any kind of record of any part of a person's life. A photo album is a kind of journal (though the meanings and remembrances will be lost if never written down), a baby book or a scrap book can be journals.

People who have kept journals: Leonardo DaVinci, Albert Einstein, Charles Darwin, Margaret Mead, Rachel Carson, Aldo Leopold, Thoreau, Eleanor Roosevelt, Enos Mills, John Muir, Edward Abbey, and Annie Dillard. There is no wrong way to keep a journal.

Students will make written journal entries, photographic or artistic entries in a book-like format. Students might also make a tape of favorite wild sounds—taken from any source to keep in a pocket inside the back cover of their journal.

Activity 1: Setting the Stage

Materials: For teachers:

- example poems
- journal entries
- photographs
- artwork
- tape of natural sounds
- leftovers of nature (seed pod, feather, leaf or leaf skeleton, rock, crystal, interesting bit of weathered wood, etc.).

Materials continued: For Students:

- a folder (the kind that will hold paper) or notebook
- paper and pen
- anything else you want to use—for example—markers, drawing pencils, charcoal
- glue
- Zip-lock bags—anything goes

Duration:
variable, minimum suggested time frame: one week with at least 15 minutes per day of quiet time offered in class. Students will also need to work on the journal in their own time.

Location:
classroom, optional school sponsored field time/outside time, student choice for location(s) encouraged, inside or out

Procedure:
1. Introduce the concept of keeping a journal. Tell students that they will be working on discovering one new thing about the natural environment around them. Let them know they will need a notebook or scrapbook of some kind. Then let them think about it for a few days—make no demands, set no time limits at this point.

2. Some time later (after lunch, or a day or two) ask the students what they think of keeping a journal; ask them if they have already noticed themselves taking note of things around them. Did just knowing that they needed to discover something new about the environment make them look more closely?

If students are not enthusiastic about keeping a journal, share the background information and/or ask them to pick something they really enjoy knowing a lot about. For example: music, sports, a hobby, the intricacies of the lives of the characters of their favorite soap opera, a favorite video game, a favorite pet. Have them start their journal with approach number one.

3. A few suggestions on ways to begin their journal:

- The Favorite Thing Approach. Start with the thing you really enjoy knowing a lot about and write about it—use the "hot pen" technique-all the ink will melt out into one big blot: write anything that comes into your head, in any order, with no concern about spelling, sentences etc., for three minutes. After three minutes compare what you have written to any natural "wild" thing, a river, a mountain, a leaf, a coyote chasing its tail. Then draw an abstract little sketch, or find a photo, or add some color.
- The Five Senses Approach. Find a place where something catches your eye. Sit and observe, use of your five senses, touch, feel, hear, see, and taste. Record your observations and ideas, what did you notice, how did you feel about this place?

Procedure continued:

- The I Just Don't Feel Creative Approach. Become the scientist naturalist. Find a piece of anything; a rock, a plant, an animal, a brick, a piece of litter. Describe the item in detail, color, texture, weight, shape, measurements, enough detail that another person could identify, draw, or recreate the item you selected without knowing what it is. After you've finished your descriptions, try to determine the purposes of the characteristics you've recorded; why is it that color, what purpose does the texture serve? If ideas and reflections begin to flow...go for it, record them too. If they don't, it's okay, study and learning give insights into many other things. Recording the observations is the important part.
- The Imitate A Mushy-Flowery-Philosophical Poet Approach. Journals are great places to get a little silly and be creative. Do your version of Shakespeare's "description of a tree." Imagine yourself to be a minimalist; find five words that describe an object, but don't relate at all to each other, add an illustration. Outline a bunch of things that strike your fancy (hand, leaf, rock, caterpillar) and write a haiku inside it.

  Write a verse for the "ballad of the bull thistle" or anything else that would make a good (bad?) country song (or Arthurian ballad for that matter).

3. Encourage students to have the first few pages of their journals filled in one sitting— filled with anything. If you need a deadline for this, give them some lead time. The 15 minutes in class can be used for recalling notes, expanding on ideas, deciding where they might go to observe next, and after a few days, for voluntary sharing in small groups. You may even want to provide some artistic media they might not have access to otherwise; paints, adhesive plastic, a mortar and pestle for grinding leaves and other sources of natural pigments.

Activity 2: Journaling - Layers of the Landscape

Materials:

- Regional Natural History Guide
- journal
- pencil or pen
- landscape

Duration: 2 hours

Location: Outdoors

Procedure:

1. Have students find a spot they will be sitting in for the duration. They should be within a small area visible to the teacher (teachers discretion), and be alone, working independently.

2. Students will use the natural history guide to find the information. It is best to view a landscape that has "layers," so they see elevational changes or landscape changes.

The layers can be something like this:

- where you are sitting—your immediate environment, ten feet around you
- foreground—20 feet to 100 feet around you
- background—the farthest distance you can see

3. In a general overview of the landscape, have students describe the ecological and geological phenomenon in the landscape. Imagination is crucial here! Slope, sun, moisture, temperature can be imagined for the landscape.

4. Using the natural history guide, describe or at least note two plants, two animals, two birds and two species of trees for each of the layers of the landscape.

5. Have students sketch at least one tree, plant or the landscape they see.

6. The activity can be concluded by bringing the students together and having them share a part of all of their experience, including how it felt to be alone and quiet, thinking about the landscape.

Follow-up:

- Follow-up is a matter of choice. What other objectives did you as a teacher have for this exercise? Should you extend the time? Is the process still fresh? Are students sharing their ideas?
- An option: set a time to quit making entries, collect the journals for a week, return them to the students to read and make final entries. This final entry should include something they discovered about the world around them, about wild places, about their thoughts.
- Have them envision a wild place where they could go to live or pursue one of their ideas. They should describe this place. Have student share their place descriptions. Discuss where these places might be found. Are these places valuable—even if you may never get to go there?
- An option: have students research other journals. Have them find a quote they particularly appreciate and put it in the next to last page of their journal. Have them make their own quote on the last page.

Extensions:

- Have students listen to a tape of nature sounds. Have them write whatever the sounds make them think of. Listen to a tape of Aldo Leopold's writings, or Thoreau's. Have the students draw what the words bring to mind—remember drawings can be impressionistic.
- Have students make a tape of their own. Either from real sounds they tape outside (hard to do) or a composite of other tapes. It should be something that makes them feel like putting ideas in their journal or makes them feel like they are in one of their wild places.

Extensions continued:

- Have students decorate/design the outside of their journals—if they haven't already. Suggest that the cover be a kind of preview of what's inside. Compile a collection of poems, quotes, illustrations to be published in a small book (you may even want to let the class sell them to cover the cost at your Earth Day Celebration).

Career Options:

nature writer, journalist, naturalist, scientist, interpretation specialist

References:

- Hammond, W.F. 1993. "Creative Journal Keeping." A Workshop Handout, page 6. Bill Hammond, Natural Context, P.O. Box 07461, Ft. Myers, FL 33919. Project WILD. 1985.
- Project WILD, "Wild Words...A Journal Making Activity." Western Regional Environmental Education Council.

LESSON 5 • **Story: Communicating Experience**

Objectives:
Students will:

- understand the use and some of the components of story by foremost environmental story tellers in historical and contemporary American culture.
- distinguish these components—description, observation, experience, metaphor and reflection.

Background:
Oral tradition, storytelling, was the primary mode of communication for primitive cultures. This topic can be fascinating to explore, considering how we communicate now, with satellite television, faxes, computers, modems etc. Story, in early cultures, was entertainment, direction, tradition, ethics, social norms, etc. Think of how media and communication shape our social norms, ethics, values today, and how they might have 1,000 years ago.

The stories examined in the second activity use a natural, in most cases "wild" setting. This genre of environmental story uses the natural world for setting, symbolism, theme, plot, adventure, conflict and resolution. The voice of the power of wildness is spoken differently in each of the selections, providing an opportunity to show the strong connections between humans and nature. Discussion can be generated by examining the symbolism of wildness in each of the stories.

Another genre of environmental literature is stories about place. These authors write of their connection to a place in which they have lived and become involved. The natural world for these authors becomes their world.

Activity 1: Parts of a story

Materials:

- Wilderness Reader, the following essays:
- Willa Cather, "The Ancient People"
- Terry Tempest Williams, "The Bowl"
- Linda Hogan, "Waking up the Rake"
- Ursula LeGuin, "May's Lion"
- Mary Austin, "Pocket Hunter"
- Edna Brush Perkins, "The Feel of the Outdoors"

Procedure:

1. Provide students with background thoughts on the use of story. Students should understand the historical use of story, oral tradition. Oral tradition conveyed morals and ethics as well as provided entertainment and leisure. Discuss the components of the story they will be focusing on: Description, Observation, Experience, Metaphor and Reflection. Review the discussion guidelines for ideas.

2. Distribute readings from the Wilderness Reader according to students' interest and your knowledge of students' capabilities. Have students read the story individually or in small groups.

3. Either through an assigned paper or through group discussion, have students identify the components that the author of their story uses. Have them explain what techniques the author uses and how well she uses the technique. The following questions can be used:

- Is the author successful in conveying a message?
- What message do you think the author is trying to convey?
- Does the author use a particular technique purposefully? Successfully?
- What did you like about the story, what did you dislike about the story?
- What are the cultural roots of the author? Can you tell?

4. Assign students to write their own stories after the group discussion.

Discussion Guidelines:

Description—an account of something; esp. an account that presents a picture to a person who reads or hears it (Merriam-Webster).

Austin, Cather and Perkins are excellent describers, they can paint a picture with their words that make a reader feel like they are in the environment being written about.

Observation—the gathering of information or knowledge by noting facts, occurrences, phenomenon, processes, colors, landscapes patterns, objects, tracks, sign of animal, etc.
Cather and Austin are gatherers. Their stories are about observation, and utilizers of observation to write. By observing her natural surroundings, Williams rediscovers nature and gains strength.

Experience—a state of being, of living, enhancing comprehension of, in these stories, the natural word, of wildness. Feeling, being aware, being attentive, discovery. Perkins writes about two women seeking experience, and resolving into experience by traveling in an unusual, adverse environment. The experience for the women led to growth, heightened awareness, sensitivity. Austin writes a story about two people, the narrator and the pocket hunter. Her story is of the narrator experiencing the pocket hunter and the profound effect of that experience. Terry Tempest Williams writes of a woman seeking and experiencing strength through a journey to a wild environment. Williams describes a full circle of experiencing city and family to nature and aloneness, to family and city. She weaves myth and symbolism into this circle.

Metaphor— A metaphor is a figure of speech or a word that is used in place of another to suggest likeness or to highlight an image, idea or message.

Discussion Guidelines continued:
Williams uses the bowl for example as a metaphor for shaping one's own world; building, shaping, reshaping, rebuilding. The bowl is a container, a receptacle. Hogan uses the metaphor of a rake to convey a deeper message about rhythm of life, the mundane of life and the boundary between injury and healing.

Reflection—What does reflection do for a person? When can a person reflect? How does a natural environment help a person reflect? Thea in "The Ancient People" (Cather), has an awakening moment of realization about the purpose of potsherds in their place. How did reflection allow this thought to be understood by Thea? Through a natural environment, Williams is able to reflect on her family and molds them out of clay, reflecting powerfully.

Supplemental
Activity 2: Landscape and Narrative

Materials:
- "Wilderness Reader: "Landscapes and Narrative," by Barry Lopez from *Crossing Open Ground.*

Procedure:
1. If possible teach this lesson outdoors in a natural area.
2. Discuss what Lopez meant by "The landscape seemed alive because of the stories" and how the story and storytelling conveyed a sense of "contact" with the wolverine "that would never be completely understood".
3. Have students describe the two landscapes—the exterior and the interior that Lopez asserts. And how the wolverine story, as told to Lopez at Anaktuvuk Pass, represents both landscapes. Note Lopez's statement that " The purpose of landscape is to achieve harmony between the two landscapes...."
4. "The power of narrative is to nurture and heal." What does he mean by this?
5. The intent of storytelling is to "evoke." What did the story evoke for Lopez?
6. Have students take 30 minutes to write a story, similar to the wolverine story, one that is of a personal experience, with the purpose of trying to evoke or make a landscape seem alive. It can be of a city environment or a natural environment, but must be centered on the person's external and internal landscape. Or have the students write a story that makes the landscape they are in come alive.

Evaluation/ Follow-up/ Extension
- Evaluate assigned paper or participation in group discussion.
- Evaluate student writing assignment of "their own stories."

Career Options: historian, author, teacher

LESSON 6 • **Perceptions of the Wild**

Objectives:
Students will:
- identify an author's view of the connections between people/ society and wilderness as communicated through one of the writer's works.

Duration: 1 to 5 class periods with additional homework

Location: indoors or outdoors

Background:
There is increasing public involvement in setting priorities and making decisions on wilderness policies. The public attitude, or value system, relating to wilderness is both affected by and reflected in literature. This activity is designed to show how wilderness has been valued by famous authors and how their views have affected contemporary values.

Activity 1: Perceptions of the Wild

Students will read one of the recommended readings, respond to discussion questions, and conduct a writing exercise adopting an author's point of view on the connection between wilderness/wildlands to people.

Materials:
- Wilderness Reader, the following essays:
- Aldo Leopold, "Thinking Like a Mountain"
- Isabella Bird, "Personality of Long's Peak"
- Patricia Goedicke, "Lost"
- discussion questions for readings, page 307-310.

Procedure:
1. Let students select one of the readings. Provide discussion questions with assigned reading to help guide the student's reading.
2. Ask the student to answer questions by leading a class discussion on the reading or as a writing assignment.

Evaluation / Follow-up / Extension:
- Response to discussion questions in written or oral form can be graded.

Evaluation / Follow-up / Extension continued:

- Ask students to respond to the following questions:

  A. Identify opinions and pick out words used to express opinions in the writing.

  B. Which phrases or words seem to be most effective in communicating a writer's opinions?

  C. Could some conflicting viewpoints be present within the same writer? If so, how? Give examples.

Career Options:

nature writer, naturalist, environmental educator, teacher

References:

Aldo Leopold, "Thinking Like a Mountain" from *A Sand County Almanac.*
Isabella Bird, "Personality of Long's Peak" from *A Lady's Life in the Rocky Mountains.*
Patricia Goedicke, "Lost" from *The Last Best Place—A Montana Anthology*

LESSON 6 • Perceptions of the Wild

DISCUSSION QUESTIONS

"Thinking Like a Mountain," by Aldo Leopold

Background:

Aldo Leopold (1887-1948) stands out as one of the premier thinkers of not only his time but for contemporary resource managers.

1. How would you explain the connection (or hidden meaning) between wolves and other living things?

    Possible response:

    Wolves are one of the top predators in the food chain. They keep deer, moose, & caribou populations in balance, otherwise overpopulation of these ungulate species might cause overgrazing on rangeland and possible starvation. All species, including people, are connected and affected by predators in some way.

2. How does the author weave "the mountain" into his story? What role does the mountain play?

    Possible response:

    The mountain represents wildness and what's best for wildlife and people. The mountain almost takes on a form of conscience for what should be wild. Examples from the story: "only the mountain has lived long enough to listen objectively to the howl of a wolf"; "mountains have a secret opinion about them (wolves)."

3. At the time this story was published (1949) people had the attitude expressed by Leopold, "We had never heard of passing up a chance to kill a wolf." What was this attitude based on? Do you agree, or disagree with this viewpoint? Explain your answer.

    Possible response:

    Leopold states, "I thought that because fewer wolves meant more deer, that no wolves would mean a 'hunters' paradise.' Some hunters today still believe this, even though biology disputes the claim. There are other factors to consider when ungulate species decline, like weather conditions, available forage, disease, etc.

4. How could you learn to "think like a mountain"?

    Possible response: Answers may vary.

5. Explain what Leopold means when he writes about "peace in our own time" and "too much safety seems to yield only danger in the long run."

    Possible response:

    People often measure success on "safety, prosperity, comfort, long life, and dullness." Perhaps wilderness, wildness, & wolves will be sacrificed if we get too carried away in striving for these "things." We should seek a balance so we can always have wilderness and wildness.

6. Explain the connection between wilderness and people, as Aldo Leopold expresses in his essay, "Thinking Like a Mountain".

    Possible responses: Answers may vary.

Perceptions of the Wild DISCUSSION QUESTIONS **continued**

"Personality of Long's Peak," by Isabella Bird

Background:
Isabella Bird journeyed as a solo woman on adventures worldwide. Suffering from poor health throughout her life, this did not prevent her from traveling unescorted and on horseback through the Rocky Mountains, riding the length of Colorado's front range, and exploring the wilds of Estes Park and points south.

1. Explain what is meant by this statement: "It is one of the noblest of mountains, but in one's imagination it grows to be much more than a mountain. It becomes invested with a personality."

   Possible response:

   Climbing Long's Peak was a daunting, frightening experience for Bird. It is one thing to admire the raw beauty of such a peak from a distance, but quite another to actually reach the top. The climb was an intense physical challenge for Bird. She was not well prepared, with a thin cotton riding dress and a pair of men's boots that were sizes too big for her. As Bird attempted to climb the peak, she realized the physical challenge; if she slipped, it might mean death. Long's Peak became bigger than any person and a wild place she accepted as having greater power than her.

2. Describe the connection Isabella Bird has with Long's Peak. Do you think it is a positive connection? Explain.

   Possible response:

   Bird was terrified during her climb. In writing of her experience after the climb, she described the peak as "the glorious sublimity, the majestic solitude, and the unspeakable awfulness and fascination...." During the ascent she described it as a time of terror, but once she reached the top, she was awed by the magnificent view. Bird described the landscape in vivid detail, "From the summit were seen in unrivaled combination all the views which had rejoiced our eyes during the ascent."

3. How would this story be written if the author had been a man?

   Possible response: Answers may vary.

4. The story takes place in 1873. Find examples in the story that express attitudes toward women during this time. Have conditions for women climbers changed since the story was written? Would your recognition of these changes alter your opinion of the author?

   Possible response:

   It was unusual for a woman to travel cross country alone. Her friend Jim was mortified to find out that Bird didn't carry a gun on her journeys. Her own boots were worn out so she borrowed a pair of men's boots that were so large she couldn't climb in them safely.

Perceptions of the Wild DISCUSSION QUESTIONS **continued**

She found a pair of small overshoes that she used for the ascent. She admits hesitancy, questioning her ability, "You know I have no head and no ankles, and never ought to dream of mountaineering; and had I known that the ascent was a real mountaineering feat I should not have felt the slightest ambition to perform. As it is, I am only humiliated by my success, for "Jim" dragged me up, like a bale of goods, by sheer force of muscle." The young men who accompanied Bird remarked "almost plainly that a woman was a dangerous encumbrance." All climbers are better equipped now, and major expeditions are led by women .

5. With maps of Colorado, locate the surrounding mountains, watersheds, and major land forms Isabella Bird describes on her climb to Long's Peak.

"Lost" by Patricia Goedicke

Background :
Patricia Goedicke lived in Mexico for fifteen years, then she moved in 1982 to Missoula, Montana, to teach in the University of Montana's Creative Writing Program. She has published eight books of poems, including *The Wind of Our Going* (1985) and *Listen, Love* (1986).

1. Describe the contrast Goedicke makes between "up there in the mountains" and "down here in the valleys." Do you think she relates more with one locale than the other? Why?

Possible response:

She writes, "...Up here on the crusty grass the bushes sparked with ice and no foot prints anywhere..." in contrast to "...Down here in the valleys among the people, the sidewalks are full of holes, faint memories of far off lakes..." Goedicke doesn't come out and say the mountains are good while the valley is bad. Yet she paints an accurate picture with words describing a wild place in contrast to civilization. The mountains are a quiet, wild place, that can easily exist without people, yet people need wild places for renewal. Answers may vary on which locale Goedicke relates to.

2. Does this poem need people as part of the scenario? If so, why? If not, explain why not?

Possible response:

Answers may vary.

Perceptions of the Wild DISCUSSION QUESTIONS **continued**

3. Why do you think Goedicke continues to make statements like, "If a fish leaps it is nothing," "If a twig snaps it is nothing," and "If a bluejay shrieks it is nothing"?

   Possible response:

   In the valley most everything revolves around people and civilization. Events are noticed by people. Up there in the mountains, nature continues whether humans are present or not. Natural events take place without our noting or noticing their passage.

4. What do you think Goedicke means when she says, "For nothing matters, once you have lost it?"

   Possible response:

   She often refers to natural events occurring in the mountains as "nothing." These natural events DO MATTER. Wild places like the mountains are important, they matter. There is a connection between people and wild places. We must respect the wild places and preserve them, as a place where humans visit, but do not remain. If humans lived in these wild places, perhaps natural events would be interrupted and disrupted.

5. Explain how this place "up there in the mountains" might represent Wilderness?

   Possible Response: Answers may vary.

LESSON 7 • **Wilderness Connections**

Objective:
Students will:

- identify authors' views of the connections between people, society, and Wilderness

Background:
There is increasing public involvement in setting priorities and making decisions on wilderness policies. The public attitude, or value system, relating to wilderness is both affected by and reflected in literature. This activity is designed to show how wilderness has been valued by famous authors and how their views have affected contemporary values. Each author represents a unique way of relating to the landscape around them and how Wilderness inspires adventure, introspection and expression.

Students will read one (or more) of the recommended readings, respond to discussion questions, and conduct a writing exercise adopting an author's point of view on the connection between wilderness/wildlands to people.

Activity 1: Connecting With Wilderness

Duration: one to five class periods with additional homework

Location: classroom

Materials:

- Wilderness Reader: "Come On In," Edward Abbey; "On the Brink of Yosemite Falls," John Muir; and "Crossing Into Eden," Wallace Stegner.
- discussion questions, pages 313-316.

Procedure:
1. If you teach urban students who have little or no experience or connection with natural areas, you should consider showing one of these videos found in the Wilderness Box: "Wilderness and the Imagination," An Act of Contrition," or "The Last Parable."

2. Let students select one (or more) of the readings. Provide discussion questions with assigned reading to help guide the student's reading.

3. Ask the students to answer questions by leading a class discussion on the reading or as a writing assignment.

Evaluation / Follow-up / Extension

- Response to discussion questions in written or oral form can be graded.
- Ask students to respond to the following questions:
- Identify opinions and pick out words used to express opinions in the writing.
- Which phrases or words seem to be most effective in communicating a writer's opinions?
- Could some conflicting viewpoints be present within the same writer? If so, how? Give examples.

Career Options:

Nature writer, naturalist, environmental educator, teacher

References:

- Abbey, Edward. *The Journey Home*: *Some Words in Defense of the American West.* New York, NY. 1977.
- Teal Edwin Way, ed. *The Wilderness World of John Muir.* Boston: Houghton Mifflin Company. 1954.
- Stegner, Wallace. *Where the Bluebird Sings to the Lemonade Springs.* New York, NY: Penguin Books. 1992.

LESSON • **Perceptions of the Wild**

DISCUSSION QUESTIONS

"Come On In" by Edward Abbey

Background:
Edward Abbey (1927-1989) is best know for his books, *Desert Solitaire, Monkey Wrench Gang* and *Hayduke Lives*. He is often viewed as the father of radical environmentalism. But in this piece, another side of Abbey is seen: his love and appreciation of the land. Students will understand Edward Abbey's perspective of the land being a "book", the concept of reading a landscape to understand the landscape's history and spiritual nature, and the human relationship with the land.

1. What part of the country is Abbey writing about? Use a map to point out the land, its location, and how you would get there from here. Has anyone been to this part of the country? If so, have students describe the country.

   Response: Answers may vary.

2. What verbs does Abbey use to describe the landscape in the beginning of the essay? What other tools does he use to describe the landscape?

   Response:

   "Surreal, strange, marvelous". Abbey describes the geologic processes and terms, and he uses the perspective of geologic history to convey a sense of mystery and intrigue. Abbey is drawn to the landscape. The connection is inspired by his introspection on its creation.

3. Abbey writes that the land is like a great book. What does he mean by this?

   Possible Response:

   It invites approaches towards comprehension on many levels, from all directions.

4. According to Abbey, what must both the poet and the scientist have in order to best understand the landscape?

   Response:

   The ability to communicate…a sense of love and wonder of what his work discovers.

5. What value does Abbey discuss?

   Response:

   Abbey touches on the economic values of the resource that are extracted from these landscapes - "what they can dig and haul away". He also touches on the regional and international treasure of land; "emptiness, its most feared or hated quality, emptiness is also its most valuable."

LESSON • **Perceptions of the Wild**

DISCUSSION QUESTIONS

"On the Brink of Yosemite Falls" by John Muir

Background:
John Muir (1838-1914) is considered to be one of the most prominent proponents of land preservation in the 19th century. He founded the Sierra Club in 1890 and fought the famous fight to preserve Hetch Hetchy Valley, a valley similar and adjacent to Yosemite Valley. His "Thousand Mile Walk" and early ramblings in the Sierra as a naturalist and mountaineer were recorded through his journals. This story is one of many where he tests his own limits and risks danger to experience the power of nature. Experience is a key concept for understanding nature for Muir. Students will get a taste of Muir's aesthetic relationship with the power of nature and be exposed to the concept of risk and exploration.

1. Have students been to Yosemite? What is their own personal experience with this place?

    Response: Answers will vary.

2. What does Muir mean when he says "so boundless an affluence of sublime beauty"?

    Possible Response:

    This is open to interpretation. Students may look up the words to help get an image. Sublime is a word Muir uses a lot. It seems to replace what might otherwise be beyond language. Discuss word choice with students and have them find passages where Muir creates an image. Muir is a master at invoking image.

3. How does fear affect Muir?

    Response:

    He seems to thrive on it, however he also expresses tremendous respect for the powers he fears, is willing to accept the fear and manage or overcome it by using that very power.

4. Why do you think Muir took the risk he did? What drove Muir to explore and stand on the precarious edge of Yosemite Falls?

    Response:

    He truly wanted to experience it to his fullest capacity. He was drawn closer and wanted to connect in the strongest way possible not just to a thing - the waterfall - but the whole process and moment.

5. Did Muir become closer to nature through his adventure? Do you think it affected his perception of nature? How?

    Possible Response:

    This event will be lodged in Muir's psyche. His strong connection will not only be a memory of adventure, but something he will build, in further explorations, into understanding and feeling connected to nature.

LESSON • **Perceptions of the Wild**

DISCUSSION QUESTIONS

"Crossing Into Eden" by Wallace Stegner

Wallace Stegner (1909-1993) was a professor of English at Stanford University. He was a prolific writer of conservation issues, the American West and stories of his childhood and changing perspective of the West. Students will gain the perspective of the wilderness visitor and understand the benefits and drawbacks of our human desire for wilderness travels.

1. This story is written over 60 years after it occurred. What stood out most in Stegner's memory of this trip? Why do you think these memories have lasted 60 years?

   Possible response:

   Perhaps it was his first trip into wilderness. Since his memory is so clear, he must have been keenly attentive, not only to details, but to feelings that it invoked in him and a sense of great wonder and enchantment. It obviously made a tremendous impression, in fact it may have directed his interests and profession. These memories of "significant life experiences" will live in each of us for long periods of time. It is interesting to think that maybe he hasn't thought about it in a long time, then all of sudden that memory is clear.

2. Of his memories of this trip, what do you think had the most profound affect upon Stegner; the fishing? the martens? the flowers? the hike? Why?

   Possible Response:

   Any or all of them. His attention to these represents a connection with wildness. His personal hiking journey gave him a sense of humility that placed him in a closer connection to everything else in the landscape.

3. Why does Stegner reveal the location of this place? Why would he usually not?

   Possible Response:

   By revealing the place, Stegner has not destroyed the experience or his connection to the landscape.

4. How has Wilderness protection affected the landscape Stegner describes? Has it helped? Has it changed? How?

   Possible Response:

   Wilderness designation may have had an impact on the amount of recreation use the area receives. This may have had an effect upon the martins and their habits; it may have disturbed the flowers or the fishing. But he points out that it has provided us with places that to the best of our ability, are protected for natural processes to continue.

LESSON • **Perceptions of the Wild**

DISCUSSION QUESTIONS

“Crossing Into Eden” by Wallace Stegner

5. What does Stegner mean when he says the best thing we have learned from Wilderness is restraint?

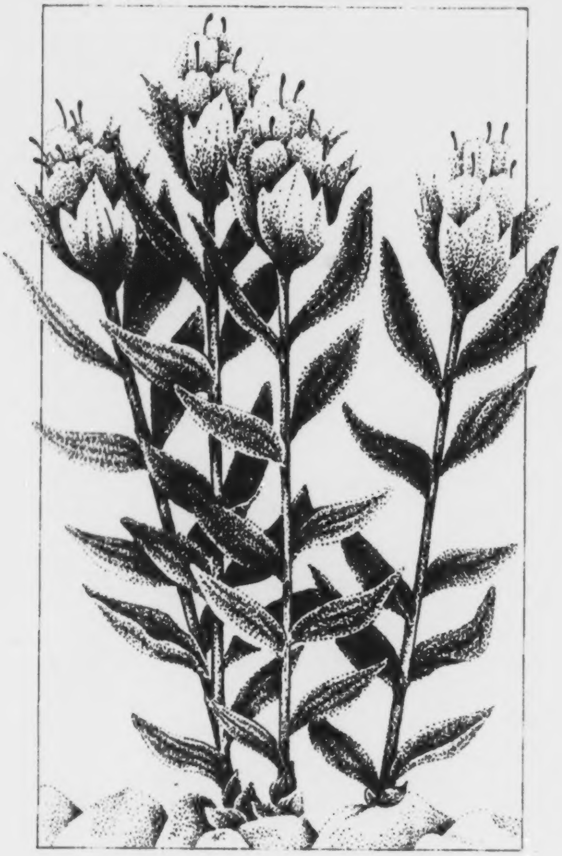
    Possible Response:

    Perhaps that, as a culture, we have learned to place values on wild places. That we don't simply see what economic benefits they hold but rather the intrinsic values of wild places.

6. For Stegner, why do we visit these places? What does it mean “for our soul's sake”?

    Possible Response: Answers may vary. This would be a good place to discuss the term “intrinsic”.

THE ARTS



LESSON 1 • **The Art of Wild Places**

Objectives:

Students will:

- collect or produce art forms depicting wilderness. The forms will include painting (watercolor, oils, acrylics), ink (pen, block), photography (black and white, color), sculpture (of any kind: paper, clay, metal, natural items....). Within each form students should try to find or use a variety of styles: impressionistic, realistic, etc.

Materials:

Materials depend on the activity chosen, but for an introduction:

- photographs and other examples of wilderness art
- copy of the Wilderness Act of 1964 found in "Wilderness: An Overview" section, pages 46-53.
- video: "The Last Parable"
- paper and drawing pencils
- art magazines, outdoor magazines
- video: "Wilderness and the Imagination"

Duration:

Variable single period: confines the lesson to showing examples of artists' work, assigning one project in one medium, or assigning a collection of examples of the forms listed in the student objectives. Multiple periods: can expand upon the given objectives and activities.

Location: indoors, can use the outdoors

Background:

Many artists through the centuries have used Wilderness areas as inspiration for their work. Dramatic mountains, quiet streams, breathtaking waterfalls, wild animals, have all found their way into the works of artists. Increasing popularity of Native American art is also bringing more of the art of natural places into today's homes. These works are found in many different media: sand paintings, ink drawings, photographs, stained glass windows, and of course paintings and sculptures. Some well-known nature artists are: Painters: Bob Kuhn, Donald Teague; Photographers: Ansel Adams, Thomas D. Mangelsen, Jim Brandenburg; and Sculptors: Anna Hyatt Huntington, Rembrandt Bugatti, Barye. Look at work of local artists if available.

Students will collect or produce art forms depicting Wilderness. The forms will include painting (watercolor, oils, acrylics), ink (pen, block), photography (black and white, color), sculpture (of any kind: paper, clay, metal, natural items....). Within each form students should try to find or use a variety of styles: impressionistic, realistic, etc.

Activity 1: The Art of Wild Places

Procedure:

1. Show the students a group of photos or works of art. Ask what they all have in common. Help them to identify that nature is the common theme throughout all of them. Where are such natural vistas found? Where can one go today to capture such impressions? Draw the discussion to Wilderness areas. Perhaps read the definition of wilderness from the copy of the Wilderness Act of 1964 found on page 46. Is there value in preserving wilderness?

2. Show the video," The Last Parable". Ask the students to watch with the eyes of an artist. Follow with a short discussion. Again, is there value in preserving wilderness? Even if you never go into it? How does wilderness art make us feel? Why do we hang pictures of mountains or meadows on our walls?

Continue with an activity.

3. Many activities are listed to give you inspiration—use these or create your own.

- Have students make a collage of photographs of works of art depicting wilderness. Choose one to recreate in other media.
- Have the students produce their own works of art—the entire class using the same medium or let each student choose his or her own.
- Have students collect one of "nature's leftovers," a rock, feather, leaf, piece of bark, and use it in a work of art. It can be the focal point, an accent, or the tool used to apply texture or color.
- Have students "sculpt" a natural subject out of human discards.
- Have students "sculpt" something humans have designed out of natural items, for example; a building out of leaves, a chain saw out of twigs, a coin out of stone or sand.
- Have the class work as a group to draw, paint, ink, charcoal, chalk, a mural on a huge piece of butcher paper. Use photographs of Wilderness areas as a reference, work to transition them all together. Then have students attach small personal works of art to the landscape.
- Take a sketch hike. Make it a scavenger type sketch hike—students need to sketch one of each of the following (for example) bird, track, rock, seed pod.
- Practice quick sketch drawing using the posters in the Wilderness Box. Or use photos, having the students pass them around to the next person every 30 to 60 seconds.
- Take "Nature's Challenge," try to recreate the structure of a natural living thing...can you sculpt a tree that looks like a tree, stands up like a tree? Can you make a rock, the rings of a tree (with passages for the flow of food and water), the teeth of a beaver (self sharpening)?

Activity 2: Wilderness and the Imagination

Procedure:

1. Show the video, " Wilderness and the Imagination". You can stop it between each section and ask the following question:

- What role does a wild landscape play in this artist's inspiration?

Procedure continued:
2. Have students choose an art form presented in the video, or they may choose one that is not in the video. Have them use the art form they have chosen for self-expression and express what wilderness means to them. If they want, students may find a song or series of songs that might speak to them. They can bring those in on a tape as a project.
3. Students may need anywhere from two to ten days to prepare.
4. Have students introduce and present their projects to the class.

Evaluation:
- Art is very subjective. In evaluating your students you may wish to give them credit for finding examples of art or for participation. You may want to evaluate the effort put into their work, based on your assessment of their capabilities, rather than their artistic ability.
- Evaluate student projects on organization, planning, and ability to convey a message.

Extensions:
- Adding any of the activities can be considered an extension.
- Consider having students research one wilderness or wildlife artist. Where did they travel, what was their favorite subject, their favorite media, when did their work begin to become recognized? Make the artist a local resident.
- Have students research the changes in "pastoral" art; is wilderness art of today the pastoral art of ages past?

Research the changes in how wilderness has been portrayed—the paintings of dark tangled unknown places and the paintings of sunlit open spaces. Does the portrayal depend on the artist and his/her experience in wild places?

Career Options:
graphic artist, wildlife artist, artist of any kind, book illustrator, professional photographer, poet, musician, interpretive display designer—the people who make the signs you see about animals and mountain ranges in the National Parks and environmental learning centers

References:
- *Images of Nature: The Photographs of Thomas D. Mangelsen.* Copyright 1989 Hugh Lauter Levin Associates, Inc.
- *"Wilderness and the Imagination"* video, U.S. Forest Service.

LESSON 2 • **Wilderness and Performing Arts**

Objectives:
Students will:

- create and perform in song, dance and drama to interpret some aspect of Wilderness appreciation or Wilderness related issue.
- express thoughts and feelings in journals.

Background:
Perhaps the strongest spiritual connection between our species and the land comes through various art expressions such as paintings, photography, music and the performing arts—singing, dance, drama and story telling. These activities provide an opportunity to develop and build a land ethic through the performing arts.

Students' level of comfort in the performing arts will vary. We have evolved into a spectator society and many students will find it very difficult to perform. But they will still have an opportunity to contribute through creating the scripts, designing the sets and being part of a chorus or group performance. Inform students of these opportunities. At the same time, encourage them to stretch it a bit by trying some solo story telling or by performing before another group such as an elementary class, neighborhood group, or with friends. Have students evaluate how it went, how it made them feel. Students engaging in these activities would benefit from the information found in the "Wilderness: An Overview" section page 1.

In Activity 1, "Story Without Words," students choose a natural process such as the growth of a tree from seed to maturity and present the process using music, video or visual arts and without using words. In Activity 2, "Do You Hear What I Hear?", students listen to two musical compositions inspired by the "Grand Canyon" and compare the ways the composers interpreted events of nature in their compositions.

Activity 1: Story Without Words

Materials:

- video camera and video tapes
- tape recorder and tapes
- art materials
- resources for students to use in researching their subjects
- student journals

Duration: 1 or more class periods

Location: indoors or outdoors

Procedure:

1. Provide a list of natural processes that students will choose as subject matter for research and interpretive art projects. Examples of processes:
    - growth of a tree from seed to maturity
    - formation of snowflake or ice crystal
    - development of bird from egg to adult
    - creation of a canyon by glacier or river
    - fire burning through a forest or grassland
2. Divide students into groups of three to five and assign, or let them choose, one process to interpret.
3. Student groups decide what media they want to use to tell the story of their process: video, still photography, mural or other visual art, music or dance. NO WORDS may be used in these stories. Students may find they want to combine media for more effective presentation.
4. Student groups make an outline or story board showing how they will use the media to interpret various steps of the natural process and list the factual information they need to obtain to make their presentation (i.e. for birds, they need to know the size of egg, time it takes to hatch, etc.)
5. Student groups research their natural process to find the important facts that they want to include in their project.
6. After necessary facts have been collected, students decide how they will express these facts without words and design and create their presentation. These projects may be created outside or in the classroom depending on images needed.

Procedure continued:

7. Display the projects and make oral presentations.
8. Assign these reflective questions as a journal exercise:
    - What did you learn about these processes without words?
    - Is it easier or more difficult for you to express yourself through visual arts and music than words?
    - What connection exists between natural processes and wild places?
    - How does the music add to your understanding of the activity?
    - Does the person's choice of music or other art form and the way they used the art say anything about the way they feel about their subject? Give an example.
    - Do these choices of art forms slant the viewer's opinions? How?
9. As follow up, do this activity using human-made processes instead of natural processes (i.e. the development of a local piece of land over 50 years).

Credit:
"Pathways: Increasing Environmental Literacy through the Arts," Gilmore, Lavino and Salomon, Teton Science School, Wyoming

Activity 2: Do You Hear What I Hear?

Materials:

- paper for drawing
- pencils, markers, crayons, paints, or pastel chalk
- tapes of "Grand Canyon Suite" by Ferde Grofe, "Canyon" by Paul Winter, "Narada: The Wilderness Collection" and Mickey Hart, "Planet Drum"

Duration: 2 class periods

Location: indoors and outdoors

Procedure:
1. Locate tapes of "Grand Canyon Suite" by Ferde Grofe and "Canyon" by Paul Winter.

2. Give students paper, pencils and markers or crayons. Play a short part of each section (sunrise, storm…) from Grofe. As each section is played, students listen and write what natural phenomena they think the composer was describing through the music. Continue music tapes while students are drawing.

Procedure continued:

3. When all sections have been heard, compile a list on the chalkboard using all the students' responses for each section.

4. Conduct group discussion:
   - Was the music universal enough to make specific natural elements come to most people's minds?
   - What instruments enhanced certain moods or scenes (thunder, rain…)?
   - Were there certain tempos that were used for specific images? Give examples.
5. Play selections from "Canyon" by Paul Winter. Conduct group discussion:
   - Compare the way he used instruments, rhythm, and other elements to musically interpret a storm, sunrise, sunset… to the way Grofe did.
   - What unique elements did Winter blend in his work? (natural sounds)
   - How similar are the two compositions?
   - Which is your favorite musical description of a storm? Sunset? Sunrise?
6. Listen to one or two selections from either composer and have students draw to the music, choosing colors and shapes that express what they hear.

7. Assign these reflective questions as a journal exercise:
   - Which of the two works (Grofe or Winter) was your favorite? Were there certain elements in the music that appealed to you such as use of certain instruments, fast or slow tempo…?
   - Choose three instruments and describe what kind of mood or natural scene you think they could be used to describe.
   - Do you like the idea of combining authentic natural sounds with music? What does it add to the piece?
   - List some different natural sounds that could be used in a musical composition and tell what instruments you would blend with each natural sound.
   - Explain how wild places serve as a source of inspiration to artists, to you.
8. Incorporate additional music from the "Narada Wilderness Collection" and Mickey Hart, "Planet Drum."

Credit:
"Pathways, Increasing Environmental Literacy Through the Arts," Gilmore, Shea, Lavino and Salomon. Teton Science School, Wyoming.

Evaluation / Follow-up / Extension

- Evaluate planning efforts, organization, and ability to convey message through different art forms.
- Use additional nature tapes you are familiar with. Tapes can be purchased through Living Music, Sausalito, CA or are available through music stores.

Career Options: performing arts professional

References:

- *Pathways, Increasing Environmental Literacy Through the Arts*, Gilmore, Shea, Lavino and Salomon. Teton Science School, Wyoming.
- *National Parks, The American Experience*, Alfred Runte.
- *Nature's Economy: A History of Ecological Ideas*, Donald Worster.
- *Celebrating Nature: Rites and Ceremonies Around the World*, Elizabeth S. Helfman.
- *Soft Paths*, Bruce Hampton and David Cole

LESSON 3 · Spaces and Places: Human Environments and Wilderness

Background:
This unit contains three activities in movement and wilderness aesthetics:

- Aimless Wandering
- Arcing
- The Grid

This three-part unit uses human movement as a teaching tool to enhance aesthetic appreciation of place and inform students of their environments, its forces and metaphor.

"Spaces and Places: Human Environments and Wilderness" was developed with the goal of enhancing students' sense of place and increasing awareness of different environments. The unit integrates creative movement exploration, reflective thinking skills, self awareness and global awareness. Journal writing and class discussion follow each movement exercise to record personal insights and better recognize and appreciate human similarities and differences.

Before Beginning this Lesson
Discuss the different ways people inhabit human made environments such as cities and rural areas versus Wilderness areas. Show photos of urban, rural and Wilderness areas and analyze these environments visually and spatially. For example:

Urban areas are densely populated centers represented by straight lines, angles and grids (seen in city street maps and a city skyline).

Rural settings offer more open spaces than urban settings. Rural habitats are less densely populated areas and may be represented by curving lines, straight and intersecting lines and angles (seen in country road maps, fence lines, and dwellings).

Wilderness areas are defined by natural conditions which are unaffected by human beings. As defined in The Wilderness Act,

> "A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the Earth and community of life are untrammeled by man, where man himself is a visitor who does not remain."

For the purposes of this unit, Wilderness areas are random spatial environments, undesigned by humans (mountain ranges, land formations, stream and river beds). Straight lines are less common in the Wilderness. They usually signify human involvement.

Activity 1: Aimless Wandering

Objectives:
Students will:

- cultivate an aesthetic sensitivity to wilderness environments
- increase students' sense of place
- identify the wild or untamed place within
- develop reflective thinking skills
- experience the formal elements of movement: space, time and energy
- develop appreciation of human diversity as well as shared experiences

Duration: 45 minutes to one hour

Location:
Outside in a large, open, natural area. This lesson encourages an inner experience which simulates being in the wilderness. Aimless Wandering can be taught on school grounds, but is most effective in a more natural setting. For safety's sake, you may want to set boundaries.

Materials:

- A gong or another percussive sound, used to begin and end exercises
- journals
- colored pencils, or magic markers

Procedure:
1. Spend 15 minutes in group discussion to set the stage for this activity emphasizing the objectives and further discussion of Wilderness, space, and natural environments.

2. (30 minutes) Rarely do we walk anywhere without a clear purpose of where we're going and why. For this exercise we will attempt to suspend conscious direction and intention of where we're walking. When you hear the gong we will each take a vow of silence for 30 minutes. During that time we will begin to walk aimlessly, without letting our minds direct our bodies about where we go. Instead, let the walk be undirected. When you notice your mind beginning to direct where you're going, let the control go. Bring your awareness into your senses (sights, smells, sounds, touch, taste) as you walk aimlessly. After 30 minutes, sound the gong again to signify the end of the exercise. At that time, return quietly for writing and discussion.

3. (15 minutes) Journal writing followed by discussion. How did this exercise feel? Describe your experience of walking aimlessly for 30 minutes. What kind of mood did it create for you? How did you experience your mind? Your body? What was your experience of the environment where you walked? What kinds of emotions or feelings did you experience? What senses were you aware of? Would you have the same feelings in the parking lot of a large shopping mall? Why is it important to have natural, wild places? How do you feel now, immediately following Aimless Wandering?

Procedure continued:
Jack Turner, a mountain climbing guide and nature writer, describes an experience in his essay "The Abstract Wild" which may be similar to Aimless Wandering when he discusses going

> ". . . into a great forest at night alone. Sit quietly for awhile. Something very old will return. . . Alone in the forest, time is less 'dense,' less filled with information; space is very 'close'; smell and hearing and touch reassert themselves. It is keenly sensual. In a true wilderness we are like that much of the time, even in broad daylight. Alert, careful, literally 'full of care.'" (P. 88)

Activity 2: The Grid

Objectives:
Students will:
- cultivate a cultural aesthetic sensitivity to space size and density
- experience range of motion in a small space, dense with people
- simulate the experience of an urban locale
- deepen awareness of individual "personal space" requirements
- increase students' sense of space
- develop reflective thinking skills
- experience the formal elements of movement: space, time and energy
- develop appreciation of human diversity as well as shared experience

Materials:
- tape recorder and tape of Harold Faltermeyer's "Axel F" or another selection of computerized music.

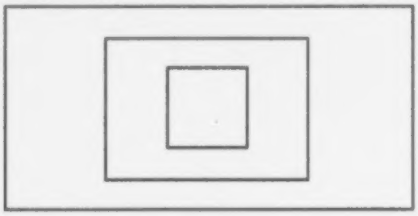
Duration: 55 minutes

Location: a small, contained area about 30' X 30'

Background: There are many political and social considerations when boundaries are defined for Wilderness areas. Wilderness managers must respect private and public land ownership adjacent to Wilderness areas. Wilderness boundaries don't always follow the natural land contours. The resulting boundaries can appear as straight lines which seem unnatural to the landscape. The following activity will simulate how boundaries affect people and the natural features of a landscape.

Activities: movement explorations culminating in journal writing and discussion

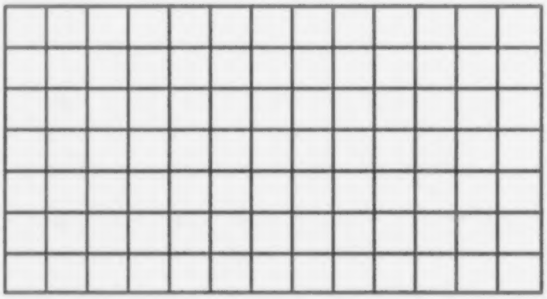
Procedure:
Part 1. (15 minutes) Identify the boundaries of an indoor area approximately 30' X 30'. All the participants begin to walk freely throughout the space. After several minutes, cut the size of the space in half and again have the participants walk freely through the space. After several minutes, cut the space in half again so the participants are walking in a very small area. Instruct them to walk past each other without touching. Walk faster. Walk slower. (By now participants should be very close, making it difficult to not collide.) After several minutes, make the space twice as large. Finally open it up to the original size area.



(15 minutes) Journal writing followed by discussion. How did these different size spaces feel to you? Which of the three size areas were you most comfortable with? Least comfortable with? What kinds of emotions did you feel? Were you comfortable in the close space? Claustrophobic? Would this experience be different if the other participants were strangers (i.e. in a big city) ? How?

Part II. (10 minutes) This time our experience of the space will be defined by a grid. Imagine lines running perpendicular to one another, like on graph paper. When the music starts, begin to walk on the grid. When you change directions you must turn sharply as if you were turning the corner. You may move forward and back but you must never arc or move along a diagonal in the space.

Music suggestion: "Axel F" by Harold Faltermeyer or computerized music.



Procedure continued:

(15 minutes) Journal writing followed by discussion This exercise simulates moving in an urban environment. Did you have the sensation of city streets and blocks? How comfortable were you in this space? Did the grid feel more predictable to you? How did you interact when you approached others on the grid? Did you find yourself interacting or moving away from others? How could the grid affect wildlife?

Follow-up Activities:

- Divide the class into small groups (of 3-5 people). Ask each group to discuss how wilderness may be communicated metaphorically through movement. Instruct students to develop a short movement "phrase" around the concept of wilderness. Each movement phrase should have a beginning, middle and end and should be short, no longer than one or two minutes. Perform the short phrases to the rest of the class.
- Repeat the above activity but focus on communicating the concept of civilization using movement. After performing this phrase, discuss how these two movement phrases differed. Compare and contrast the different movement choices for wilderness and civilization.
- Have students watch the video "Wilderness and Imagination." Discuss the inspirational impacts of wilderness. If you were an accomplished artist (musician, sculptor, poet, dancer, painter, novelist) where would you draw your inspiration? Does nature inspire you? How? What other things inspire you?
- Discuss the different career options presented by this lesson: dancer, nature writer, landscape architect, city planner, artist, musician, mountain climbing guide. Do any of these career options seem attractive to you? What kinds of steps would you take to achieve that goal?

References:

- Blom, Lynne Anne and Chaplin, L. Tarin. *The Moment of Movement*: Dance Improvisation. Pittsburgh: University of Pittsburgh Press. 1988.
- Campbell, Linda. Campbell, Bruce. Dickinson, Dee. *Teaching and Learning through Multiple Intelligences*. Stanwood, WA: New Horizons for Learning. 1992.
- Turner, Jack. *The Abstract Wild,* Witness. Vol. 3, No. 4 (winter 1989).
- The Wilderness Act of 1964.
- "Wilderness America's Enduring Resource" (video), U.S. Forest Service.
- "An Act of Contrition" and "Wilderness and the Imagination," U.S. Forest Service.

Music References:
The following music references may be purchased in most record stores, or ordered.

- "Four Seasons," by Antonio Vivaldi.
  (There are hundreds of records of this on various labels; this is one example.)
- Environments (Series)
  "Country Stream"
  "Gentle Rain in a Pine Forest"
  "English Meadow"
- Beverly Hills Cop (soundtrack)
- "Axel F." by Harold Faltermeyer.

Supplemental
Activity 3: Arcing

Objectives:
Students will:

- cultivate an aesthetic sensitivity to a defined environment
- increase students' sense of place
- deepen awareness of individual "personal space" requirements
- develop reflective thinking skills
- experience the formal elements of movement: space, time and energy
- increase movement improvisational abilities
- develop appreciation of human diversity as well as shared experiences

Duration: 40 minutes

Location: a confined area approximately the size of a gymnasium

Background: no previous experience needed

Activities: movement explorations culminating in journal writing and discussion

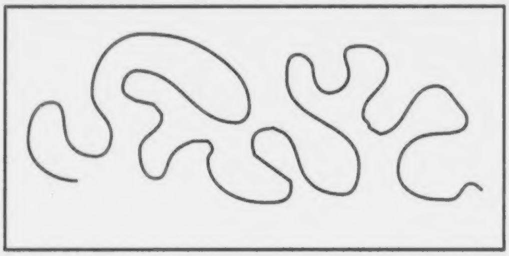
Materials:

- gong or a tape recorder
- cassette of Vivaldi "The Four Season's," or space music, or environmental music such as trickling water, wind or aviary sounds

Procedure:

1. (5 minutes) For this exercise, limit the size of the exercise to an area the size of a basketball court. When you hear the gong or the music begin to walk throughout the area only using curving pathways. You may make small arcs and large curves and circles, changing directions frequently. You'll be crossing and passing other people, intersecting their lines, but you may never move in straight lines.

2. (5 minutes) Repeat this curving pathway but this time make all your curves travel backwards. Be sure to turn your head so you can see where you're moving in the space. Again you'll be arcing around and past the other people.



3. (15 minutes) This time we'll arc through the space with a "no-walk rule." Instead of walking you must find a different locomotor movement to arc you through the space. Experiment with unusual ways of traveling. If students are unsure of what locomotor movement to use, first have them arc and curve using:

jogging
crawling
marching
bouncing
skipping
leaping
floating
slithering
jumping
galloping
soaring
hopping
prancing
tiptoeing

Now, make up your own! Find how many new locomotor movements you can come up with. Change your locomotor movement frequently. You may also keep changing your direction so you travel both forward and backward .

4. (15 minutes) Journal writing followed by discussion Write in your journal how it felt to experience this continuous arcing and curving. Did it feel endless and continuous? Was it tiring? Energizing? How did you experience the space? How did you experience the other people moving in the space? If you were to compare this spatial movement experience to an environment, what would the place be like? How can you make a connection with natural cycles in wild places? Describe it visually.

LESSON 4 • **Historical Photographs**

Objectives:
Students will:

- examine historical photographs and images portraying Wilderness and wild places.
- develop appreciation for the historical and cultural significance of Wilderness.
- create stories to describe images presented in photographs.

Duration: 1 to 2 class periods

Location: classroom

Background:
Historical photographs have captured many images of Wilderness from the aesthetic images of Yosemite National Park captured by Ansel Adams to photographs taken by land management agencies showing the manual labor of trail building and horsepacking. It is through these images that we are able to travel back in time to examine the wilderness idea seen by people living in the 19th century.

The video, "Wilderness: An Act of Contrition", combines music, memorable quotes and beautiful images to give a chronological account of the Wilderness movement. It is a powerful video of images that tell the historical wilderness story with an artistic style. Students will review the video and historical photographs and examine why certain images were used to portray the Wilderness movement.

Activity 1: A Wild Image Frozen in Time

Materials:

- historical photographs
- video: *Wilderness: An Act of Contrition*

Suggested Reference Materials:

- books: *The First 75 Years, National Park Service, Centennial Mini-Histories of the Forest Service, The First Ranger—Adventures of a Pioneer Forest Ranger, Public Lands, Public Heritage, The National Forest Idea,* and *Ansel Adams Photography*

Procedure:

1. Introduce the lesson by showing the video. Discuss the images presented in the video. Ask students to describe impressions the images made on them. How were these images used to portray the historical account of the Wilderness movement?
2. Break students into small groups and distribute copies of wilderness photographs, or have students examine historical photographs in books recommended in the materials section. Ask each group to examine photographs and be prepared to:
   - compile ten adjectives to describe the images.
   - explain the connection between the images and Wilderness.
   - select one photograph to develop story ideas about what you think the photographer is trying to convey.
3. After each group has shared their impressions, ask individual students to each select a photograph to write a story about. Use the discussion questions from the small group activity to serve as inspiration.
4. Display stories and photographs in a public place.

Evaluation / Follow-up / Extension:

- Evaluate group presentations and writing assignment.
- Assign students to capture images of Wilderness in photographs. This assignment can vary in depth from reviewing popular outdoor magazines to creating a portfolio of photographs they have taken describing personal definitions of Wilderness.
- Conduct historical research on the life and work of Ansel Adams, or others.

Career Options: historian, photographer, photo journalist, artist

References:

- *The First 75 Years, National Park Service*
- *Ideas For Wilderness Information and Education, U.S. Forest Service*
- *Centennial Mini-Histories of the Forest Service, U.S. Forest Service*
- *The First Ranger-Adventures of a Pioneer Forest Ranger, C.W. Guthrie*
- *Public Lands, Public Heritage, The National Forest Idea, Alfred Runte*
- *Ansel Adams Photography*

LESSON 5 • **Landscape Artists and Photographers**

Objectives:
Students will:

- develop a knowledge of and appreciation for the evolution of American landscape art from the 19th to the 20th century.
- discuss the role that the natural environment has played in inspiring works of art.

Duration: 1 to 2 class periods

Location: classroom

Background:
Artworks about the landscape, particularly paintings, have always been popular with the American public. Since the last century, developments in landscape painting have closely followed the Industrial Revolution and territorial expansion of the United States. Landscape painters of the early nineteenth century such as Asher B. Durand, Thomas Cole, and Frederic Edwin Church varied in their interpretations of the American landscape. Asher B. Durand presented nature as an idyllic and benign environment, a pristine garden for man's activities. Thomas Cole also depicted the American wilderness as Edenlike, a natural sanctuary where the world-weary soul could find God, but he perceived nature as an all powerful entity that was difficult to tame. Frederic Church's huge paintings were intended to overwhelm the viewer with the awesome power and beauty of natural phenomena. Painting during the Industrial Revolution, these artists responded to the citizens' need for nostalgic images of a land that was changing quickly. People wanted to see romantic reminiscences of the way things were when the settlers lived in harmony with wilderness.

Instead of painting broad, sweeping views of wilderness, George Caleb Bingham sought to bring nature much closer to the people in his paintings of life along the Missouri River. He found folk heroes in the people who lived in communion with nature.

Americans also wanted pictures and stories of the unknown and unexplored regions of the continent. In the late 1860s Albert Bierstadt traveled to the far West and began painting pictures that provided easterners with their first visualizations of the grandeur and romance of these lands. Nearly all of Bierstadt's paintings were large, expansive landscapes and included picturesque representations of the people who lived there, particularly Native Americans.

At the turn of the century, the urban and industrial landscape became a popular theme in American painting. Artists such as Thomas Eakins showed the value of naturalness and solitude in the busy, developed world we had created in our cities. Although many of his landscapes were set in public parks and artificial waterways, they demonstrated that it was

Background continued:
possible to experience nature in the modern world.

The development of photography allowed Americans to bring the "real thing" into their homes. Ansel Adam's outstanding black and white photographs of views of America's National Parks presented almost eternal visions of these national treasures and coincided with the influx of visitors to the parks.

As modern art changed, so did the approach to depicting the landscape. Modern artists like Georgia O'Keefe and Arthur Dove no longer sought to render nature the way it looked, but rather the way it made them feel. They tried to paint their intimate and spiritual connections to with the land, not just their aesthetic appreciation for it.

The next important change in artwork addressing the landscape came in the 1960s with the development of Earthworks. Sculptors such as Robert Smithson and Christo did not create art about nature, but began to use the actual landscape as their medium. They transformed the environment itself and invited the viewer to experience nature in a new and perhaps enhanced way.

Activity 1: Landscape Artists and Photographers

Materials:
- landscape art slides

Procedure:
1. Introduce the lesson by showing the slides of the evolution of landscape art. Run through the slides once quickly. Ask the students to keep the following general questions in mind as they watch the slides. Then facilitate a discussion of each of the slides using the specific question.

General questions:

- Do you see any major trends in the way artists depict the landscape?
- Where does the artist locate the viewer?
- What national trends were going on in the country that might have impacted the way artists depicted wilderness?

Specific Questions:

- What two ways of life or attitudes toward nature are represented in Cole's, "The Oxbow?"
- What is Cole saying about nature and spirituality in "The Voyage of Life?"
- How does Church use the color red in "Twilight in the Wilderness"? How does it make you, the viewer, feel?
- What kind of impression was Bierstadt trying to create for people who had never been to the West?

Procedure continued:

- What does the river mean to the men in Bingham's "Fur Traders Descending the Missouri"?
- How important is the city park or waterway in Eakin's "Max Schmitt in a Single Scull"?
- In what way did the invention of photography impact Eakin's painting style?
- How do you think Ansel Adam's photographs impacted the growth and use of our National Parks?
- How do Dove and O'Keefe feel about the natural environment? In what ways do these modern artists make us think differently about nature?
- How have Smithson and Christo transformed the environment? What kind of a statement are they making about landscapes? What do Earthworks tell us about natural settings?
- What impact do you think photography had on the evolution of landscape art? Do you think it impacted the way artists portrayed landscapes?
- Why do you think there was such a dramatic change in the way nature is portrayed by modern artists such as Arthur Dove and Georgia O'Keeffe?
- What process do you think these artists have to go through prior to undertaking a project such as "Running fence?" How do you feel about having artists use the natural environment as their medium?

2. Have students write a 1-2 page essay describing their favorite landscape. What values about the American natural environment does it convey?

Slides:

1. Asher B. Durand, "Edge of the Forest," 1871.
2. Thomas Cole, "The Oxbow," 1836. Metropolitan Museum of Art. New York City.
3. George Caleb Bingham, "Fur Traders Descending the Missouri," 1845. Metropolitan Museum of Art.
4. Frederic E. Church, "Twilight in the Wilderness," 1860. Cleveland Museum of Art, Cleveland, Ohio.
5. Albert Bierstadt, "The Rocky Mountains, Lander's Peak," 1863. Metropolitan Museum of Art.
6. Thomas Eakins, "Max Schmitt in a Single Scull," 1871. Metropolitan Museum of Art.
7. Ansel Adams, "Teton Range, Snake River."
8. Georgia O'Keeffe, "Evening Star, III," 1917. Collection, the Museum of Modern Art, New York. Mr. & Mrs. Donald B. Strauss Fund.

Slides continued:

9. Arthur Dove, "Sunrise, No. 3," 1937. Yale University Art Gallery, New Haven, Connecticut.
10. Robert Smithson, "Amarillo Romp," Shale, 1973
11. Christo, "Running Fence," 1976.

Evaluation / Follow-up

- To develop an understanding of the American school of landscape art from the mid 19th Century, have students read at least one of James Fenimore Cooper's "Leatherstocking Tales;" *The Pioneers* (1823), *The Last of the Mohicans* (1826), or *The Prairies* (1827).
- Study photographs from Ansel Adam's photography book.
- Select a local landscape artist or photographer to study.
- Take a field trip to a local museum or art gallery to observe artworks about wilderness or the landscapes.
- Invite a local landscape artist or photographer to speak to your students about how nature/ Wilderness inspires his/her artwork.
- Create your own artwork inspired by nature.

Career Options:
Art teacher, artist, photographer.

References:

- Brown, Milton W. and Sam Hunter. American Art.
- Chacon, Raphael, University of Montana, Art Department.

LESSON 6 • **Photography**

Objectives:
Students will:
- learn how to use a 35 mm camera for field studies and communication.
- interpret the importance of wildlife and Wilderness as an inspiration for art.

Background:
The camera is an indispensable tool for field study in Wilderness. Equally significant, the camera has helped turn the minds and hearts of millions toward Wilderness by capturing some of the spirit of Wilderness by artists such as Ansel Adams and Dave Muench. These activities will introduce the value and use of the camera to students.

Most students have access to a 35 mm camera. If you are not familiar with camera use, inform the students you'll be learning with them. Invite a local photographer (who is experienced in nature and landscape photography) to address the class. A student, parent or local photographer will often welcome this opportunity. If there is a photography or yearbook teacher in your school, consult them for ideas.

Students participating in these activities will benefit from lessons in the OVERVIEW strand. These lessons will give students adequate background on Wilderness concepts before moving into this lesson on photography.

Activity 1: Photos Keep It Happening!

Materials:
- 35 mm camera
- 400 ASA black and white film
- telephoto and macro lens would be useful
- other visual media: drawing materials, magazine photos may be substituted

Duration: 3 class periods, less if lab work is not involved

Location: outdoors for photography, indoors for lab work and display

Procedure:
1. Ask students to select a wild animal for study. Some students may want to consider constructing a "photographer's blind" for use in observing wild animals outside without

Procedure continued:
disturbing them. Other students may find wildlife in zoos. Remember wildlife ranges from small to large—house flies and caterpillars included! Make sure that students do not disturb the animals they are observing and photographing.

2. Recommend the students aim for a series—five photos, for example—of images of the wildlife representing various aspects of the animal and its historical or contemporary influence on human culture.

3. If possible, have students develop and print their images. Ask the photographers to describe their techniques and experiences, including their feelings of the importance of wildlife as an inspiration for art as well as insights they gained into the influence of Wilderness and wildlife on human culture.

4. The mounted photo series can be made into an exhibition for others to enjoy.

Credit: Project WILD, "Photos Keep it Happening!"

Evaluation / Follow-up / Extension

- Evaluate student projects for organization, appearance, quality of processing (if they developed their own photos) and effectiveness to convey a message or inspiration.
- Contact your local state wildlife agency, bird watching organization, or similar group to see if they can provide talks on wildlife photography.

Career Options:
outdoor photographer, wildlife biologist, Wilderness manager, teacher, outdoor educator

References:

- Project WILD, "Photos Keep it Happening"

Lesson 7 • “Oooh You Wild Thang”— Wild Places Used in Making the Pitch

Objectives:
Students will:

- identify the use of Wilderness and wild places in advertising.
- collect 10 examples of wild places and Wilderness areas being used as a “grabber/seducer” for selling products, at least fifty percent of their collection will include items not directly tied to Wilderness or outdoor recreation.
- list 3 reasons why many products cannot be taken into designated Wilderness.
- list 3 behaviors shown in advertising that may encourage behaviors by real people that could be detrimental to the area or dangerous to the person in Wilderness.

Duration:
1 or 2 class periods depending on number of activities done and the extent to which they are carried.

Location: indoors

Background:
Think of how many commercials there are on television, how many ads there are in magazines and newspapers. Many of these try to sell us a product that will make us more efficient or allow us to use our leisure time in exciting ways. Many agencies try to romanticize their product and for many people today that includes getting away to a simpler, wilder place.

- the 4WD vehicles out by a quiet lake—after a good day of fishing, now we’re sitting by a blazing campfire
- the batteries whose packaging is illustrated with “Spring in Yellowstone National Park”
- the computer screen-saver that features 40 full color images of the Adirondack Mountains, Death Valley National Park, Grand Canyon, Yosemite Falls, Alsek Glacier, and many others
- the lone motorcycle rider on a classic bike at sunset—on a deserted beach (no sign of development or habitation) selling chewing tobacco

Teachers, take five minutes to look through your magazines—you’ll be amazed.

Background continued:
Some people are concerned about the use of wild places to sell products. One concern is based on improper or damaging use of a site during the filming or photography. Other concerns are based on the idea that the advertisement not only sells the product but also sells the behavior they are portraying with the product. Should we really be encouraging people to buy 4WD vehicles so they can get anywhere in the mountains or forests? Should we glamorize the presence of a large group of people having a good time on the bank of a river? Is building a big fire by the side of a lake an example of low impact camping? Do we really want all of middle America to hop in their car and head for the great outdoors with no more knowledge than what they receive in advertisements? In Activity 1, students will make a collection of graphic or print ads and TV ads (using a record sheet). Optional: make a class collection of all of their advertisements and TV commercial records. In Activity 2, students will participate in a simulated discussion involving three parties: an advertising agency, a US Forest Service review team, and a concerned group of citizens.

Activity 1: Advertisement Collection

Materials:

- example advertisements taken from magazines and newspapers, possibly a video of a TV commercial. (For the class collection you may want to get a long piece of butcher paper for mounting the collection so it can be hung in a hall to make others aware.)
- copies of the student handout: TV Advertisement Data Sheet, page 344.

Procedure:

1. Introduce the lesson and set guidelines for collecting the advertisements. Show examples.
2. Distribute copies of the student handout "TV Advertisement Data Sheet," no more than two for each student (i.e. can have four commercials in their collection).
3. Suggest publications for the remaining graphic advertisements. Try to get students to look in less obvious places; newspapers, catalogs not pertaining to outdoor gear, magazines that aren't directly related to outdoor recreation.
4. Set a deadline for having collections completed.

Follow-up:
When students bring in their collections, there are several ways you can follow up.

- Using the blackboard, list item categories (vehicles, food and drink, personal items, clothing, etc.) place hash marks under the category headings for each person's collected ad. Is there a trend? What images are receiving the most exposure?

Follow-up continued:

- List potentially undesirable behaviors that are being portrayed; high impact practices, personally dangerous practices, things that aren't really feasible in the setting they are portrayed.
- Discuss what is in the advertisement that appeals to people, and what other messages are being sent.
- Have the students make a class collage of the ads and hang them in a place where other classes can see. Add an explanation or caption of why the project was done.

Activity 2: Simulation Discussion

Materials:

- student handout, "Simulation Background Information," pages 345-349.

Procedure:

1. Photocopy the student handout, and with the participants' background information, slice up into singular strips.
2. Have each student draw one from a hat. Optional: give students 30 seconds to trade if they really want to.
3. Give students 10 minutes to prepare their three minute presentation for "the town meeting." A representative of the advertising agency should contact the forest service and vice versa. Encourage creativity, use of class props.
4. At the end of the 10 minutes, have the students select a mediator for the meeting.
5. Review your rules for class discussions.
6. Have the advertising agency and product representatives present first. Then have the forest representatives present second. Open the floor to the citizens for their input.
7. Allow the discussion to continue until there is a general consensus with a majority or until there are only 5 - 10 minutes left in class.

Follow-up

- Halt the discussion and have everyone write down their vote and one reason why they voted either for or against the filming project.
- Have students turn these in after you've tallied the vote in class.
- Further discussion is optional.

Evaluation / Extensions:

- Students can be evaluated on participation, given credit for a complete collection of advertisements, having a reason for voting the way they did in the town meeting, etc. A paper and pencil quiz can include listing 3 reasons why products such as vehicles, parachutes, chainsaws, motor cycles, and, motorboats cannot be found in designated wilderness (and when exceptions are made). The quiz can also include listing 3 detrimental behaviors that are being promoted in advertising.
- Have students try to find the item most unrelated to outdoor experiences that is being marketed with an outdoor theme. Have the students make their own graphic advertisement for a magazine; depicting a product that is shown responsibly in a wild place or in the place it is most likely to be used.
- Have students take a magazine advertisement and caption it "What We See" then make a drawing titled "What We Don't See" or "What We'd Like To See." Hang these pairs together for others to view.
- Have students make their own commercials (video) for low impact camping gear.
- Hold a class discussion posing these questions: Is nature only to be used or enjoyed? Is nature inherently worth protecting?

Career Options:
graphic artist, ad layout and design, photographer, advertising agency representative, creative team (ad agency): jingles and songs, film, art, dialog, product research, consumer reporter, consumer watchdog, independent testing agent, land use researcher

References:

- Project WILD, "Does Wildlife Sell Cigarettes?"

Activity 1: Advertisement Collection

STUDENT HANDOUT • TV Advertisement Data Sheet

- What was being sold?____
- How was the wild / natural area included?___________________________________
- What time of day was the commercial aired?__________________________________
- What show were you watching when you saw the commercial?____________________
- What group of people might be the target audience for this commercial?______________
____
- List an example____
____
- How might the commercial be better designed?_________________________________
____

TV Advertisement Record

- What was being sold?____
- How was the wild / natural area included?___________________________________
- What time of day was the commercial aired?__________________________________
- What show were you watching when you saw the commercial?____________________
- What group of people might be the target audience for this commercial?______________
____
- Did the commercial show responsible use of the natural area? yes or no______________
- List an example____
____
- How might the commercial be better designed?_________________________________
____

Activity 2 : Simulation Background Information

STUDENT HANDOUT • **Simulation Background**

Advertising Product Agent: You want to sell a new all terrain vehicle that can run on water as well as trails. You think the best way to portray your product is to show all kinds of activities that people could do using your new machine. You want to film your commercial in the National Forest because you have a place picked out that will allow you to do all of your filming in one general area. By doing all of your filming in the Swallow Lake area you will save thousands of dollars over trying to find different locations for each film clip.

Advertising Creative Designer: You want to do three 10-second spots that will be combined into a 30-second commercial. You figure that filming and logistics could keep you in the field for two to three days. One spot will show a family of four riding their water ATVs (WATVs) down a trail on their way to Swallow Lake. You want to film the whole family from the front (to show their smiling faces) so you'd like to have them ride side by side for a short distance in an open field. There is such a field on the way to Swallow Lake. It is in National Forest, not designated Wilderness.

Advertising Creative Designer: You're doing the second spot of the commercial. You are responsible for shooting the on-water scenes. You'd like to show the family arriving at the inlet river to Swallow Lake. The river is big and wide, but slow moving, and there is a great spot on the other side to set up the fishing / picnic shot. You feel you need to cross the river because the banks are gentle with almost no hill at all. The banks of the lake are steeper and may erode under the passing of four WATVs. By crossing the river, your team is not disturbing the lake more than once.

Advertising Creative Designer: You're responsible for the OOh-AAh ending. Your idea is to have the family having their picnic on the edge of the lake—they look up and see a brightly colored parasail coming down. It's attached to a WATV. A second parasail follows with a person guiding it down. The WATV lands in the lake and floats. The person lands on the edge of the lake, sheds the parachute, throws a smile and a shrug at the family and swims out to the WATV. At closing we see the family hug the new person who replies "you didn't think I'd miss the family picnic did you?"

Advertising Logistics Agent: You're hiring people from the nearby town of Swallow Village to help in the production. You are also making hotel reservations in the town for all of the crew. Since there is no other town nearby, you expect that all of the meals will be eaten in Swallow Village. You are bringing at least $85,000 in revenue to the town.

Advertising Public Relations Agent: You and the rest of the advertising team are working with the town's people and the Forest Service to get this commercial shot.

Activity 2 : Simulation Background Information

STUDENT HANDOUT • **Simulation Background continued:**

You are under a lot of pressure because the owner of WATV Inc. wants this commercial done or your advertising agency may lose the contract. The contract to your agency is worth 5 million dollars, and if production finishes on schedule, you will all get a bonus of 1% of the contract value. If any compromises are made you will be the one to present them to the owner of WATV Inc.

Federal Land Manager: You have the responsibility of upholding forest and Wilderness regulations. The trail to Swallow Lake is on National Forest Land, Swallow Lake, however, is just inside the Wilderness boundary for the Always Winter Wilderness. There is one private residence "inholding" on the far shore of the lake. It is owned by an elderly gentleman who has agreed to pass the property on to the Wilderness system when he dies. He has a small outboard motorboat with a 5 hp engine that he uses to cross the lake to get to the trail out of the area. He has lived there and used his boat since before the area was designated Wilderness. Off highway vehicles are permitted on the trail up to the Wilderness boundary, they are discouraged in meadows because they can be very damaging.

Federal Land Manager: You have section 2 article C of the Wilderness Act of 1964. Work with your staff. Definition of Wilderness. (c) "A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the Earth and community of life are untrammeled by man, where man himself is a visitor who does not remain." An area of wilderness is further defined to mean in this Act "an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfirmed type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value."

Federal Land Manager: You have section 4 article C of the Wilderness Act of 1964. Work with your staff. Prohibition of Certain Uses (c) "Except as specifically provided for in this Act, and subject to existing private rights, there shall be no commercial enterprise and no permanent road within any Wilderness area designated by this Act and, except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons with the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other forms of mechanical transport, and no structure or installation within any such area."

Activity 2 : Simulation Background Information

STUDENT HANDOUT • **Simulation Background continued:**

Federal Land Manager: You have section 4 articles D. 1 and 2 of the Wilderness Act of 1964. Work with your staff. Special Provisions (d) "The following special provisions are hereby made: (1) With wilderness areas designated by this Act the use of aircraft or motorboats, where these uses have already become established, may be permitted to continue subject to such restrictions as the Secretary of Agriculture deems desirable. In addition, such measures may be taken as may be necessary in the control of fire, insects, and diseases, subject to such conditions as the Secretary deems desirable. (2) Nothing in this Act shall prevent within national forest wilderness areas any activity, including prospecting, for the purpose of gathering information about mineral or other resources, if such activity is carried on in a manner compatible with the preservation of wilderness environment. Furthermore, in accordance with such program as the Secretary of the Interior shall develop and conduct in consultation with the Secretary of Agriculture, such areas shall be surveyed on a planned, recurring basis consistent with the concept of wilderness preservation by the Geological Survey and the Bureau of Mines to determine the mineral values, if any, that may be present; and the results of such surveys shall be made available to the public and submitted to the President and Congress."

Federal Land Manager: You have section 5 article A of the Wilderness Act of 1964. Work with your staff. State and Private Lands Within Wilderness Areas (a) In any case where state-owned or privately owned land is completely surrounded by national forest lands within areas designated by this Act as wilderness, such state or private owners shall be given such rights as may be necessary to assure adequate access to such state owned or privately owned land by such state or private owner and their successors in interest, or the state owned land or privately owned land shall be exchanged for federally owned land in the same state of approximately equal value under authorities available to the Secretary of Agriculture: Provided, however, that the United States shall not transfer to a state or private owner any mineral interests unless the state or private owner relinquishes or causes to be relinquished to the United States the mineral interest in the surrounded land."

Federal Land Manager: You feel that a compromise should be made in the interest of the town of Swallow Village. You live in this town and it is economically poor. If the commercial is stopped, you may not be very popular and it will become harder for you to do your job. However, if the advertising agency is given free rein, you may have a hard time enforcing Wilderness regulations for other people. You suggest using the meadow, which is in forest land, but not the lake which is in the Wilderness.

Activity 2 : Simulation Background Information

STUDENT HANDOUT • **Simulation Background continued:**

Citizen: You know that when the area was considered for Wilderness there was discussion about not including Swallow Lake because of the private residence and high lake use (because it is close to Swallow Village). Is it possible the Department of Agriculture and the Forest Service should consider proposing to Congress that the Wilderness boundary be moved?

Citizen: You are the elderly landowner. You need the outboard engine because you can't row.

Choice 1: you don't want the area disturbed.

Choice 2: you'd like to have the commercial filmed on your property so you can be paid for it.

Citizen: You regularly fish in Swallow Lake.
Choice 1: you don't want a WATV landing in your favorite fishing spot.

Choice 2: you don't see any harm, as long as they do it in one take.

Citizen: You like to hike and bird watch in the meadow on the way to Swallow Lake. You want to know how all of the filming equipment and people will get to the site.

Citizen: You own the hotel where the film crew will be staying. It is possible that without this revenue you may go out of business this next year. Does this affect your opinion of the film project?

Citizen: You own a restaurant, you need the business, but could probably survive without it. You have always wanted to be able to use your small boat with an outboard on the lake. Do these things affect your opinion about the commercial project?

Citizen: You have been asked to be one of the actors, you would earn $1000 dollars, but you're a little concerned about the effect on the environment. What are your concerns? Are they worth $1000?

Activity 2 : Simulation Background Information

STUDENT HANDOUT • **Simulation Background continued:**

Citizen: You live in Swallow Village and sell snowmobiles, you would like to be the area distributor for WATVs. If the commercial is shot in your area, will it help or hurt your business?

Citizen: You live in Swallow Village and you're not sure you want the rest of the world to know what a nice place it is. Will the commercial say where it is being filmed?

Citizen: You're a compromiser, suggest some ideas. After all, you've lived in town for years.

Citizen: You think it's a great idea. The place needs some excitement. You've lived in this area for years. Or...it's a bad idea, you don't like anything about it.

Citizen: You hunt in the Wilderness area. What will a low flying plane and parasails do to disturb the wildlife in the area? When will the commercial be filmed?

Citizen: Play yourself, you're just visiting in town with some relatives. What are your opinions?

Citizen: You enjoy riding your off highway vehicle on the national forest trails. What do you think?

Citizen: You own horses and regularly ride the Swallow Lake Trail into the Wilderness. You've had some good and some bad experiences with meeting ATV type vehicles on the trail. Do you want the trail's presence advertised?

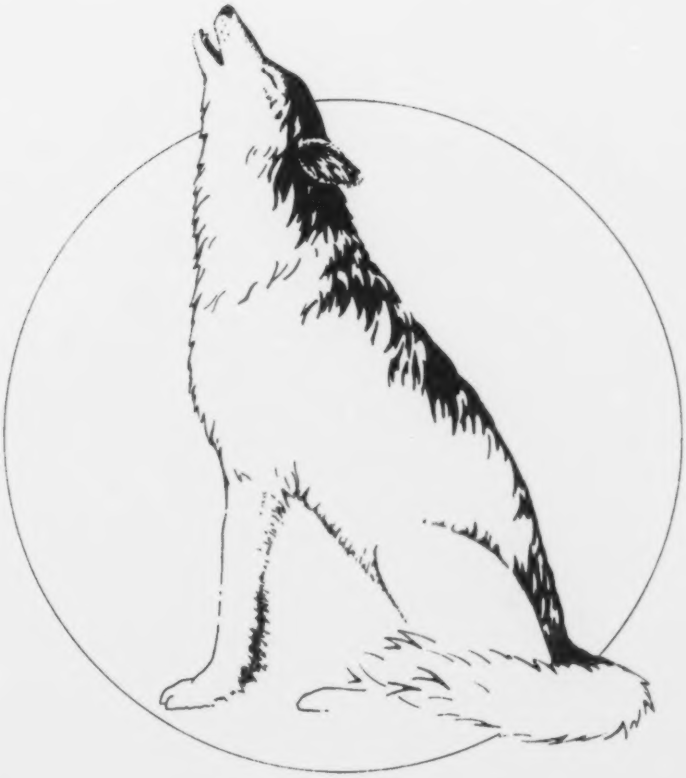
Citizen: Play yourself, you're just passing through, but like the area and wanted to check out the town meeting. You may want to move to this area.

Citizen: You are a college graduate student doing research on plant species around the lake—what will this do to your data?

Citizen: Your most favorite movie (or music) star in the whole world will be playing the part of the parasailer. You may get to have this person over for dinner if the commercial is filmed.

Citizen: Play yourself, you're just passing through but you've been asked to comment.

SCIENCE



LESSON 1 • **Wilderness Ecosystems**

Objectives:
Students will:
- understand the different wilderness ecosystems and their interconnectedness.
- understand how land ethics is applied to all land types and classifications regardless of natural or political boundaries.

Duration: 3 class periods

Location: classroom

Background:
The word ecosystem refers to the system of interactions between living and nonliving things. Wilderness represents diverse ecosystems including low deserts and high deserts, wetlands like swamps and bayous, forests and shorelines, mountains and valleys, glaciers and sand dunes, canyons and plateaus, and rain forests. Even though there are approximately 104 million acres designated as Wilderness, there are at least 90 million more acres of wildlands managed under other land designations. Presently, the National Wilderness Preservation System includes only 81 out of the 233 distinct ecosystems recognized by the Forest Service in the fifty states and Puerto Rico.

For the most part, Wilderness ecosystems are just like any other ecosystem. What makes them unique is that natural processes are allowed to operate freely, they are often of large scale, with diverse habitat. The size and shape of vegetation patterns is a good example. In areas of land influenced by human activities, vegetative patterns are regular and predictable, often following straight lines. In natural ecosystems, the size and shape of patches and openings in vegetation are very diverse and rarely follow straight lines.

Scientists believe that Wilderness areas hold important keys to our future. For instance, over one half of the medicines and drugs we use today come from plant and animal sources. Large natural ecosystems serve as “gene pools” and harbor the potential to adapt to environmental changes because of this genetic diversity.

One way Wilderness ecosystems serve to benefit people is their role as natural base lines. They give us something with which to compare other environments that have been modified by human activities. Natural ecosystems also provide scientists with important information on the effects of global pollution, which is very difficult to isolate and measure in populated areas where other pollutants occur.

Background continued:
What scientists can learn about Wilderness has applicability outside Wilderness in our daily lives. Stands of old growth trees provide excellent sites for timber harvest outside Wilderness, but inside Wilderness (where no timber harvesting is permitted) old growth forests are allowed to die, and can provide us with many lessons in their usefulness. Dead trees do have value in natural systems. Often dead trees will remain standing for several years as "snags" and provide homes and food sources for hundreds of animal and bird species. Logs on the forest floor also provide habitat for animals and insects, and play a valuable role in nitrogen fixation. Downed trees also help stabilize stream banks, and often dam up and reroute streams, creating side channels with quiet water and rich nutrients important in fish production.

Scientists have found that 70-80% of the biomass in the forest is underground in tree roots. These and other discoveries made through research on Wilderness ecosystems have profound ramifications on resource management activities outside designated Wilderness.

Wilderness areas are not entirely free of human influences. Global pollution has reached into all Wilderness areas. Also historic and current human activities continue to alter natural systems. Examples include grazing of domestic livestock, big game hunting, fish stocking, fire control and recreational activities. Many nonnative plant species have been introduced in Wilderness, and diseases like white pine blister rust have been imported from other countries.

Until recently, most management of Wilderness ecosystems has focused on cosmetic concerns and how natural the wilderness appears to visitors. The bulk of management efforts on ecological systems in wilderness focused on impacts from recreation use, primarily on campsites and trails. Ecosystems transcend political boundaries. What happens inside protected Wilderness affects what happens outside of Wilderness, and vice versa. Land managers are adopting far reaching land stewardship management strategies paying closer attention to managing entire ecosystems, not just islands of Wilderness for recreational purposes.

Activity 1: A Journey Through the National Wilderness Preservation System (NWPS)

Materials:
- Wilderness slide show and script
- slide projector
- NWPS map
- Poster board

Procedure:
1. Define what an ecosystem is and brainstorm what ecosystems might be represented in Wilderness areas.

BEST COPY AVAILABLE

Procedure continued:

2. Show the Wilderness slide show to students. Ask them to record different ecosystems represented in the program.

3. Divide the class into two equal groups. Explain that each group will make a game for the other. The object of the game will be to match animals to the Wilderness environment in which they live.

4. Ask each group to choose five ecosystems represented in Wilderness areas they would like to know more about, such as desert, hardwood forest, coniferous forest, alpine, and marine. Divide each group into the five smaller groups, one per Wilderness ecosystem. Each group will review the NWPS map and select a different Wilderness ecosystem to study. Have each group research their Wilderness ecosystem, listing its characteristic life forms and describing adaptations of the animals that enable them to survive in that Wilderness ecosystem.

5. Ask each student group to make a poster showing the characteristic vegetation, terrain, etc. in the Wilderness ecosystem they are studying. Posters can be made with crayons, paints, markers or magazine cutouts.

6. For each Wilderness ecosystem, students should make five cards, one for each of five species of plants and animals characteristic of the Wilderness ecosystem. Include at least one species that is rare, threatened or endangered. Put a description of the plant or animal's adaptations to its environment on one side of the card, and a coding number on the other side, so the plant or animal described can be identified later. Do NOT write the name of the plant or animal on the card.

> EXAMPLE: for a desert environment
>
> Card one: "Hunts at night for warm rodents and sleeping birds; can climb loose, sloping sand by throwing loops of its body up like coils." (sidewinder rattlesnake)
>
> Card two: "Relies on agility and speed to escape predators; needs little water; gets water from plants it eats." (cottontail rabbit)
>
> Card three: "Hunts at night; lives in burrows of animals like gophers." (burrowing owl)
>
> Card four: "A bird which hibernates in winter to avoid desert cold." (nightjar)
>
> Card five: "Moth feed on the flowers of this plant." (yucca plant)

7. After posters are made and cards done, students in each half of the class should make a master list of the five ecosystems, plants and animals their cards represent. Next, shuffle all the cards for their five Wilderness ecosystems together into one pile.

8. Each group then exchanges posters and cards with the other group.

9. Next give each half of the class the master list for their posters. One student per group can read off the animals and plants that correspond with each card for each poster.

Procedure continued:

10. Has each plant and animal been placed in its proper Wilderness ecosystem? If not, why? Were there any animals found in more than one Wilderness ecosystem? Are these Wilderness ecosystems varied? How can some plants and animals live in more than one ecosystem, and not others? What are similarities and differences among the Wilderness ecosystems and characteristic life forms? What are some of the most interesting plant and animal adaptations? What functions do these adaptations serve? How do they relate to the nature of the physical environment? Ask students what characterizes animals and Wilderness environments in which they live. (Each environment has characteristic life forms. These animals and plants are adapted to live where they do.)

Adapted from Project WILD, "Who Lives Here?"

Evaluation / Follow-up / Extension

- A complimentary lesson can be found in Project Aquatic WILD, "The Edge of Home."

Career Options:

ecologist, conservation biologist, botanist, wildlife biologist, landscape architect, environmental advocate

References:

- Project WILD, Aquatic Project WILD
- Wilderness America, A Vision of the Future of the National's Wildlands, The Wilderness Society, 19[illegible]
- Fact sheet: Wilderness Ecosystems, Natural Resource and Environmental Education Demonstration Project, U.S. Forest Service and Wilderness Institute, School of Forestry, University of Montana

BEST COPY AVAILABLE

Lesson 2 · **Wilderness Research**

Objectives:
Students will:
- identify research questions related to Wilderness.
- evaluate appropriate kinds of research related to Wilderness.
- design and conduct a Wilderness-related research project.

Duration:
Three to five 45-minute periods plus homework, minimum time frame—research could be extended for a longer time frame.

Location: classroom and possible field locations

Background:
Research, by definition, is a quest for knowledge. All research is driven by or starts with a question. Questions about what we see or don't understand drives this quest. Research is a creative process where researchers are constantly creating new ways to understand how "things" work. Research does not necessarily require intervention or experimentation and may be entirely based on observation and data-gathering techniques. One area of scientific research involves the study of various aspects of Wilderness. Wilderness research findings present a framework for Wilderness managers to assess management decisions based on the best quality information. Such research may be conducted in the field or in laboratory settings. Research may involve Wilderness directly, indirectly, or both. For example, research may focus directly on physical or biological factors such as water or air quality, soil conditions and plant diversity, or the role of fire in Wilderness; or may focus indirectly on factors outside Wilderness such as human settlements, logging, roading, overflights; or on societal factors such as human attitudes, beliefs, and values. To manage an area, we consider many questions about the impact of people, livestock, water and air pollutants, or fire exclusion. From these questions we develop guesses about explanations, causes, or reasons why we see what we do. This is called the hypothesis. Research is nothing more than trying to see if our explanation (or hypothesis) is valid or not.

National leadership for Wilderness management research is provided by researchers at the Aldo Leopold Wilderness Research Institute in Missoula, Montana. Social scientists provide managers with information on wilderness users' characteristics, behavior, and expectations. Biologists and Ecologists provide an understanding of the ecological impacts that visitors may cause in various Wilderness settings, and how those impacts can be minimized. More broadly, wilderness researchers seek answers to questions concerning impacts to the naturally functioning ecosystem from factors inside hand outside the Wilderness boundary. Results of research is useful to managers when developing wilderness plans and policy.

Background continued:

The Wilderness Act provides solid support for research in Wilderness. The Act states that "Wilderness shall... be administered ....for the gathering and dissemination of information" and regarding the uses of Wilderness areas "shall be devoted to.... scientific, and educational.... use." Research is considered a valid and important use of the Wilderness resource and is encouraged as long as projects do not degrade Wilderness character and there are no alternatives for conducting that research outside Wilderness. For example, research and monitoring devices may be installed and operated in Wilderness only when the desired information is essential and cannot be obtained from a location outside of Wilderness, and the proposed device is the minimum tool necessary to accomplish the objective safely and successfully. If proposed studies are not compatible with Wilderness values, managers work with applicants to find alternative locations or access. An example involved the Forest Service participating in a national survey of Wilderness lakes by the Environmental Protection Agency in 1985. Helicopter access to sample the lakes was initially requested but the Forest Service proposed, and helped complete, the sampling using foot or stock travel.

Better inventory of the physical and biological resources is critically needed to provide current base line information. This will serve as a benchmark for environmentally induced change in the future, to support other scientific studies, and to monitor the impacts that recreational uses have on wilderness resources.

The major purpose of this activity is for students to develop reasons for research questions related to Wilderness. Students will design a research proposal and they will consider what seems appropriate and inappropriate kinds of research and research practices. A proposal might be a behavioral study (e.g., students observe how people seeking solitude are influenced by other people seeking a recreational experience). Their study might involve census work (e.g. how many people are "too many" for an area before restrictions are needed?) The research project does not need to involve Wilderness directly, but for example, could involve a survey of people's attitudes concerning Wilderness. Such a research project could explore whether students think Wilderness is an essential part of our heritage and future. Students could design and implement a survey asking people whether or not they support the idea of Wilderness and why or why not.

BEST COPY AVAILABLE

Activity 1: Wilderness Research

Students develop research questions involving Wilderness, apply their results to develop individual research proposals that meet criteria for appropriateness and conduct Wilderness-related research.

Materials:

- writing materials
- possible need for access to reference materials
- observation tools such as video cameras, sketch books, and lens, etc.
- "A Sand County Almanac" by Aldo Leopold
- Copy of the Wilderness Act of 1964
- Wilderness Reader: Wilderness Research: Future Needs and Direction?

Procedure:

1. Make copies of "Wilderness Research: Future Needs and Direction" from the Wilderness Reader. Assign the reading to provide background information for this lesson.
2. With your students brainstorm a list of possible questions concerning Wilderness or Wilderness management research.
3. Discuss what seems to be reasonable, acceptable, and appropriate research, and what does not.
4. Ask each student to classify their Wilderness research questions as acceptable or unacceptable, and their reasons for these classifications. Following this personal evaluation, ask them, as a group, to develop a set of criteria for acceptable and appropriate Wilderness research.
5. OPTIONAL: Before categorizing and evaluating the various types of Wilderness research, ask the students to do some library work to find additional information on their research question. A few students could be asked to place telephone calls or write letters for additional information. For example, local agencies or organizations that might conduct research related to Wilderness could be contacted to find out what kinds of research they conduct and what methods they use. Please review the information students would ask for, before students place their calls or send their letters, to assure the clarity of the request and to coordinate the inquiries, avoiding duplication of effort. If such contacts are made, ask students to report back to the rest of the class.
6. Ask each student to design and write a "Proposal to Conduct Research." If the project directly involves Wilderness, have the students become familiar with the Wilderness Act and incorporate it into their plan. The plan must take place on the school grounds or other approved site and follow the class determined ethical guidelines developed in step 3.
7. Evaluate each proposal to determine that it follows the class determined ethical guidelines and mandates of the Wilderness Act. Ensure the plan is realistic. This lesson could take much longer than one week to complete. A scientific researcher or Wilderness ranger might be available to review the plans and make suggestions. Students are often surprised at how narrow their research questions will have to be.

Procedure continued:
8. After project approval, students conduct their research. They should compile their results and, if possible, draw conclusions. Their data may not support any conclusions. It is important for students to learn not to extend their conclusions beyond what their data supports.

Credit: Adapted from Project WILD, "Wildlife Research."

Evaluation / Follow-up / Extension:

- Students can identify areas for further study and, if time permits, conduct some of those studies.
- Ask students to respond to this hypothetical situation: Suppose you are the director of a wilderness research institute at a university and have been told by the university president that your program is under review for possible elimination from the budget. You have been requested to submit a justification for the continuation of your research program. What will you say?
- Assign students to read an essay from *A Sand County Almanac*, entitled " Wilderness for Science". After reading the essay, ask students to write an essay on why Wilderness research is important.
- Students can organize a panel of speakers from the local research community who work for land/wildlife management agencies and colleges/universities to present views on the role of research in Wilderness and public lands.
- Refer to the "Wilderness Management Case Studies", page 124. Provide case studies for a small group activity. Ask student groups to determine how wilderness research can help Wilderness managers with management solutions. A designated speaker from each group can present a management dilemma and potential solutions to the class. Wilderness-related research topics might include: water & air quality, range condition, sensitive and endangered species (plant or animal), role of fire, archaeological survey, and recreation (for example, wilderness mountaineering, campsites conditions, visitor perceptions).

Career Options:
scientific researcher, Wilderness manager, Wilderness ranger, professor.

References:

- *Wilderness Awareness Training Module*, Arthur Carhart National Wilderness Training Center
- Peter Landres, research scientist, Aldo Leopold Wilderness Research Institute
- *A Sand County Almanac*, Aldo Leopold

BEST COPY AVAILABLE

Activity 1 : Wilderness Research

STUDENT HANDOUT

Research, by definition, is a quest for knowledge. All research is driven by or starts with a question. Questions about what we see or don't understand drives this quest. Research is a creative process where researchers are constantly creating new ways to understand how "things" work. Research does not necessarily require intervention or experimentation and may be entirely based on observation and data-gathering techniques. One area of scientific research involves the study of various aspects of Wilderness. Wilderness research findings present a framework for Wilderness managers to assess management decisions based on the best quality information. Such research may be conducted in the field or in laboratory settings. Research may involve Wilderness directly, indirectly, or both. For example, research may focus directly on physical or biological factors such as water or air quality, soil conditions and plant diversity, or the role of fire in Wilderness; or may focus indirectly on factors outside Wilderness such as human settlements, logging, roading, overflights; or on societal factors such as human attitudes, beliefs, and values. To manage an area, we consider many questions about the impact of people, livestock, water and air pollutants, or fire exclusion. From these questions we develop guesses about explanations, causes, or reasons why we see what we do. This is called the hypothesis. Research is nothing more than trying to see if our explanation (or hypothesis) is valid or not.

National leadership for Wilderness management research is provided by researchers at the Aldo Leopold Wilderness Research Institute in Missoula, Montana. Social scientists provide managers with information on wilderness users' characteristics, behavior, and expectations. In the area of Biologists and Ecologists provide an understanding of the ecological impacts that visitors may cause in various Wilderness settings and how those impacts can be minimized. More broadly, wilderness researchers seek answers to questions concerning impacts to the naturally functioning ecosystem from factors inside and outside the Wilderness boundary. Results of research is useful to managers when developing wilderness plans and policy.

The Wilderness Act provides solid support for research in Wilderness. The Act states that "Wilderness shall... be administered ....for the gathering and dissemination of information" and regarding the uses of Wilderness areas "shall be devoted to.... scientific, and educational.... use." Research is considered a valid and important use of the Wilderness resource and is encouraged as long as projects do not degrade Wilderness character and there are no alternatives for conducting that research outside Wilderness. For example, research and monitoring devices may be installed and operated in Wilderness only when the desired information is essential and cannot be obtained from a location outside of Wilderness, and the proposed device is the minimum tool necessary to accomplish the objective safely and successfully. If proposed studies are not compatible with wilderness

Activity 1 : Wilderness Research

STUDENT HANDOUT

values, managers work with applicants to find alternative locations or access. An example involved the Forest Service participating in a national survey of Wilderness lakes by the Environmental Protection Agency in 1986. Helicopter access to sample the lakes was initially requested but the Forest Service proposed, and helped complete, the sampling using foot or stock travel.

Better inventory of the physical and biological resources is critically needed to provide current base line information. This will serve as a benchmark for environmentally induced change in the future, to support other scientific studies, and to monitor the impacts that recreational uses have on wilderness resources.

The major purpose of this activity is for students to develop reasons for research questions related to Wilderness. Students will design a research proposal and they will consider what seems appropriate and inappropriate kinds of research and research practices. A proposal might be a behavioral study (e.g., students observe how people seeking solitude are influenced by other people seeking a recreational experience). Their study might involve census work (e.g. how many people are "too many" for an area before restrictions are needed?) The research project does not need to involve Wilderness directly, but for example, could involve a survey of people's attitudes concerning Wilderness. Such a research project could explore whether students think Wilderness is an essential part of our heritage and future. Students could design and implement a survey asking people whether or not they support the idea of Wilderness and why or why not.

BEST COPY AVAILABLE

LESSON 3 • Noxious Weeds in Wilderness—What can I do?

Objectives:
Students will:

- identify native and nonnative plant inhabitants of their area and of the United States.
- give examples of effects of introducing plant species to an area where they were not originally found.
- identify weeds, determine why a weed is classified exotic versus noxious, and list potential effects to native vegetation, wildlife, and water quality.
- identify, map, and inventory weeds using a weed handbook, and develop an on-site weed management plan.

Background:

I. GENERAL INFORMATION

Where did weeds come from?

Prior to the arrival of Europeans to North America the idea of weeds was unknown. Environments throughout the world have evolved simultaneously to include the geology, vegetation and animal life from large animals to the smallest fungus. Species evolving over time created a balance between each other and their changing environments. Every habitat provides a niche for specific types of vegetation and the animals feeding upon this rich resource. The balance occurs when species adhere to an unspoken set of rules that utilize the bounties of nature without reducing the species' ability to survive.

Europeans brought foreign plants over to this continent in the hay used to feed their animals and soil was used for ballasts on the ships. Once the left over feed and animals were brought ashore, the plants took advantage of disturbed soils and quickly spread. Since these plants did not evolve in the North American environment, they did not have the same competition from other plants for the same space. Also, the plant diseases present in Europe's soil and the many insects that helped keep these plants from overpopulating were absent in their new home.

When does a plant become a weed?

Weed is a name we've given to any plant that is unwanted. To become a weed, a plant must be successful enough to be a nuisance, grow quickly, and reproduce so successfully that it crowds out native or desirable plant species in their competition for sun, water and nutrients taken from the soil. Most plants we have identified as weeds came from other countries. Like our native plants, they too were in balance in their old ecosystems and developed characteristics to survive and other species kept their populations in check. Now in the new world, they hold a competitive edge over native vegetation, since no natural predators keep them in balance and prevent them from exploiting their new environment.

Weeds are classified into two groups, **exotic** and **noxious**. Plant species that have been identified as exotic weeds are not native to the ecosystem. They are usually nontoxic and under most circumstances can be removed much easier than noxious weeds (depending on how widely they are spread). Noxious plants establish themselves in a foreign environment and attempt to out-compete the native plants. Many are allelopathic, which means they release toxic substances into the soil and inhibit the growth of native plants that did not evolve with a tolerance to these chemical compounds.

II. NOXIOUS WEED MANAGEMENT IN WILDERNESS

The Wilderness Act states: Wilderness should be "managed to preserve natural conditions." Preserving natural ecosystems means keeping weeds out.

WILDERNESS: a place of diversity

Wilderness is a place of diversity and balance. This balance means plants and animals are dependent on each other and the ecosystems in which they live. When balance exists, each of them can live, but none of them dominate and prevent others from living. This results in a heathy diverse ecosystem that provides food and shelter for many different kinds of plant and animal life. This diversity is the key to stability, and Wilderness is that place set aside for the protection and appreciation of biodiversity. Wilderness provides a base-line inventory for intact ecosystems and a reference to land management practices taking place outside Wilderness. Weeds have upset the biological balance in many Wilderness areas throughout the nation.

Prevention is the key to keeping weeds out of Wilderness and education is the most useful tool to provide the information to Wilderness visitors. Weeds need a disturbed soil surface in order to establish themselves in an environment. Often this occurs from impacts related to human activity. Human-created impacts in Wilderness may come from recreational use. Also, trail building and maintenance of existing trails create a disturbed soil surface for weeds to begin growing.

Weeds and their seeds can be transported in many different ways into the Wilderness.
While packing gear at trailheads, use special precautions to ensure you are not transporting weed seeds in or on your equipment. Hikers need to check each other for weed seed hitch hikers that may be attached to their gear, boots or clothing before entering the Wilderness. If you are a stock person, shake all your manties, pick seeds from your horses' tails and wipe all gear free of weeds. Pack only certified weed seed free feed into the backcountry.

BEST COPY AVAILABLE

Activity 1: Who Lives Here?

Materials:
- access to research materials
- writing materials

Duration: 2 to 3 class periods

Location: classroom

Background:
Fossil remains indicate that even in prehistoric times some plant populations traveled to different geographical regions in response to climatic and other conditions. These movements took place over long periods of time. In some cases original plant species of an area died out and became extinct.

Natural land and water barriers have prevented some species from spreading to certain areas. But people, with their sophisticated transport systems, have changed the plant populations of islands and continents. Many plants that we take for granted as native residents of the United States actually were not on this continent when the first European settlers came; other original species have been destroyed.

Changes that once took place gradually have been accelerated by human manipulation of plant populations. Human beings sometimes move plants to their advantage, sometimes to their ultimate disadvantage, with mixed results for people and the environment. Some introduction of plants to new areas is accidental; some intended, for example, as a management strategy.

The major purpose of this activity is to acquaint students with the distinction between native and nonnative species as well as the benefits and risks involved in introducing nonnative species to areas. Students research and write reports about native and introduced plant species and conduct a class "quiz" and discussion.

Procedure:
1. Explain the background information to your students. Then, go around the room asking each student to guess if the plant you name is a native (indigenous) or nonnative (introduced) species to the area of the United States it now inhabits. OPTIONAL: Get photos of each. For example:

Some introduced species:

knapweed, goats tongue, leafy spurge, hemp, dandelion, clover, & alfalfa

Some native species:

biscuit root, Indian paint brush, mountain aster, bear grass, huckleberry, and lady slipper

NOTE: Select native and nonnative species located in your area.

2. Ask each student to choose one of these plants to research, including:
   - Is it native to the area it inhabits?
   - What, if any, are the benefits of its presence?
   - What, if any, are the detrimental effects of its presence?
   - What is the history of its presence? (If introduced, include how and why it was introduced.)
   - What regulations, if any, exist concerning this plant? (Contact Soil Conservation Service, U.S. Forest Service, Bureau of Land Management, National Park Service, U.S. Fish & Wildlife Service and state agencies).
3. Ask students to write a short research paper on their plant. Also, have each student write the name of his or her plant on a piece of paper. Collect these and use them for a native/nonnative quiz. Have the students vote "native" or "nonnative" as each name is pulled from a box. Then have the student who did research comment on that plant. Students can direct the voting, presentations and discussion. Were there some surprises? Plants thought to be native that turned out to be introduced? Based on all the plants studied, do there seem to be more positive or negative effects from introducing nonnative species to environments?

Credit: Project WILD, "Who Lives Here"

Activity 2: Weed Management Field Trip

Materials:
- student handout: "Weed Names and Weed Codes," pages 367-368.
- student handout: "Noxious Weed Inventory Form," page 369.
- clipboards and pencils
- cameras and film
- weed identification handbook from your region
- clippers, hoes, garbage bags for weed transport, work gloves
- native seed and spreader
- fertilizer if deemed necessary by weed expert

Duration: from two hours to a full day

Location: school yards, trailheads and city/county parks

BEST COPY AVAILABLE

Procedure:

1. Contact local county extension services, state, federal or park weed specialists (U.S. Forest Service, National Park Service, Bureau of Land Management, and U.S. Fish and Wildlife Service) for assistance in planning and conducting this field trip. Prior to the field exercise students need to be familiar with the weed management in the area of their field trip.
2. Using the weed identification handbook, students will identify and list both common and noxious weeds. Identify the native species present and the abundance compared to weed numbers.
3. Using the student handouts "Weed Names and Weed Codes List" and the "Noxious Weed Inventory Form," students will complete forms to include: documentation of location (review mapping skills), using appropriate symbols for weeds identified, weed density and distance to water. Explain to students that this is how professionals/scientists perform a survey.
4. Use photo documentation as a monitoring tool. Students will take photos of the site. Use before and after photos to evaluate your effectiveness.
5. Discuss the environmental effects which may be caused by weed management efforts or if controls are not implemented.
6. Discuss the use of biological controls and their effectiveness in long-term weed management.
7. As recommended with the weed specialist you are working with, broadcast native seed over the disturbed soil surface to encourage seed growth and discourage weed growth.

Evaluation / Follow-up / Extension:

- Name five species that are native (indigenous) to the United States.
- Name five species that nonnative (introduced) to the United States.
- When plants are introduced to new areas, they can either become extinct or be successful in their new home. What usually happens to other plants when an introduced species is successful? Why?
- List and explain four reasons why plants may be introduced to an area.
- Make a visual illustration to convey some of the possible effects of introducing nonnative species into a habitat. Show "before" and "after." Provide examples to explain your portrayal.
- Research to find out if any plant species listed as threatened or endangered in your area are a result of competition from nonnative species. Provide an example explaining how and what has happened to the threatened or endangered plant species.
- The pre/post test will allow the teacher to identify students' knowledge base on weeds.
- Students can develop a weed management plan for their backyard, school grounds, or city/county parks.
- Students can study herbicide movement and effects on plants.
- Conduct "Noxious Weed Pull-Ups" contest with students.
- Ask students to pull weeds when they find them and report back the location to the nearest county conservation district, forest service, or park office.

Career Options:
county extension agent, soil scientist, botanist, ecologist, Wilderness manager, scientific researcher

References:

- *Montana Weed Project Teachers Handbook,* Resource Education Awareness Project by Gary Swant.
- *Noxious Weed management Short Course*, Montana Weed Control Association with the cooperation of the U.S. Forest Service and Montana State University.
- *Northwest Weeds, the Ugly and Beautiful Villains of Fields, Gardens, and Roadsides,* Ronald J. Taylor.

Activity 2: Weed Management Field Trip

STUDENT HANDOUT

Weed Names and Weed Codes List

Common Name	Scientific Name	Code
Alfalfa	*Medicago sativa*	MEDSA
Austrian fieldcress	*Riruooa austriaca*	RORAU
Austrian pea weed	*Swiansona salsula*	SWASA
Buffalobur	*Solanum rostratum*	SOLCU
Camelthorn	*Alhagi pseudalhagi*	ALHP
Canada thistle	*Cirsium arvense*	CIRAR
Common burdock	*Arctium*	ARFMI
Common crupina	*Crupina vulgaris*	CJNVU
Dalmatian toadflax	*Linaria dalmatica*	LINDA
Downy brome	*Bromus tectorum*	BROTE
Diffuse knapweed	*Centaurea diffusa*	CENDI
Dyers woad	*Isatis tintoria*	ISATI
Field Bindweed	*Convolvulus arvensis*	CONAR
Goatweed (St Johnswort)	*Hypericum perforatum*	HYPPE
Globepodded hoarycres	*Cardaria pubescens*	CADPU
Henbane	*Hyoscyamus niger*	HSYNI
Hoary cress(Whitetop)	*Cardaria draba*	CADDR
Houndstongue	*Cynoglossum officinale*	CYWOF
Jointed goatgrass	*Adgilops cylindrica*	AEGCY
Leafy spurge	*Euphorbia esula*	EPHES
Loosestrife	*Lythrum salicaria*	LYTSA
Musk thistle	*Carduus nutans*	CRUNU
Ox-eye daisy	*Chrysanthemum leucanthemum*	CHYLE
Perennial pepperweed	*Lepidium latifolium*	LEPLA
Perennial sowthistle	*Sonchus arvensis*	SONAR
Plumeless thistle	*Carduus acanthoides*	CRUAC
Poison hemlock	*Conium maculatum*	COIMA

Activity 2: Weed Management Field Trip

STUDENT HANDOUT

Weed Names and Weed Codes List continued

Common Name	Scientific Name	Code
Puncturevine	*Tribulus terrestris*	TRBTE
Quackgrass	*Agropyron repens*	AGRRE
Rush skeletonweed	*Chondrilla juncea*	CHOJU
Russian knapweed	*Centaurea repens*	CENRE
Scotch thistle	*Onopordum acanthium*	ONRAC
Showy milkweed	*Asclepias speciosa*	ASCSP
Silver-leaf nightshade	*Solanum elaeagnifolium*	SOLEL
Skeletonleaf bursage	*Ambrosia tomentosa*	FRSTO
Smoothe brome	*Bromus inermis*	BROIN
Spotted knapweed	*Centaurea maculosa*	CENMA
Syrian bean caper	*Zygophyllum fabago*	ZYGRA
Tansy aster (Common)	*Tanacetum vulgare*	CHYVU
Tansy mustard	*Descurainia pinnata*	DESPE
Tansy ragwort	*Senecio jacobaea*	SENJA
Timothy	*Phleum pratense*	PHLPR
Wild carrot	*Daucus carota*	DAUCA
Woolly (common) mullein	*Verbascum thapsus*	VESTH
Yellow starthistle	*Centaurea solstitialis*	CENSO
Yellow sweetclover	*Melilotus officinalis*	MEUOF
Yellow toadflax	*Linaria vulgaris*	LINVU

Credit: Weed Science Society of America Accepted Names and Weed Codes

Activity 2: Weed Management Field Trip

NOXIOUS WEED INVENTORY FORM

Year	#	Weed	Location	Acreage	Cover/density
1994	6/sq. ft.	Sk	T.R. Section	4	Moderate

Other Species Present:

Estimate of infestation level:

a. L = low: occasional plants/acre, less than 5 percent canopy cover

b. M = moderate: widely scattered plants, 5-25% canopy cover

c. H = high: more dense, 25-100% canopy cover

Symbols:

Names and weed codes used to identify each weed species is provided by the Weed Science Society of America

LESSON 4 • **Endangered Species**

Objectives:
Students will:
- identify and describe factors contributing to the endangering of species.
- recall why Wildernesses are important for threatened & endangered species recovery.

Background:
Why should we recover threatened and endangered species?

- **ECOSYSTEMS**
- **ETHICS**
- **AESTHETICS**
- **ECONOMIC BENEFITS**
- **LAWS**

Some habitat has been set aside in the form of parks, wildlife refuges, Wilderness, and other reserves. Since 1964 when The Wilderness Act was passed, approximately 104 million acres have been included in the National Wilderness Preservation System. Efforts to boost a species' numbers won't mean much in the future if the habitat of an animal or plant doesn't exist or if the area is too degraded to support the species. **Habitat protection** is ultimately the key to saving threatened and endangered species.

Few Wildernesses are big and diverse enough to meet the year-round needs of all the fish and wildlife populations that use a Wilderness. Some wildlife species such as grizzly bears require vast undisturbed areas to which Wilderness boundaries may not be related. Certainly most of the Wilderness areas in the East are too small to contain the entire ranges of many species. Can adjacent habitat be managed to develop natural boundaries that will contain and protect the animals?

The U.S. Fish and Wildlife Service's Grizzly Bear Recovery Plan recognizes that grizzly conservation cannot be accomplished on a Wilderness-by-Wilderness basis because a bear can cover 1,000 square miles in a lifetime of normal activity. The resulting plan tries to coordinate management efforts in the two remaining viable grizzly habitats in the lower 48 states—the Yellowstone ecosystem in Wyoming, Idaho, and Montana, and the Northern Continental Divide ecosystem in Montana, Idaho, and Washington. The plan requires coordinated management in the Wildernesses and adjacent wildlands. **No Wilderness exists in a vacuum.** It is always surrounded by and/or abuts something that can markedly affect Wilderness management for wildlife within the area (Hendee, Stankey, and Lucas, 1990). Conservation biologists estimate approximately 100 species are becoming extinct every day. Wildernesses may provide some of the critical habitat for threatened and endangered species.

Students will review the list of endangered species and conduct research on a species of their choice. With information gathered, students will prepare a written report or oral presentation and come up with solutions for species recovery.

Activity 1: Endangered Species

Materials:
- Use of the World Wide Web (WWW) is required.
- National Wilderness Preservation System map.

Duration: 1 to 5 class periods

Location: classroom

Procedure:

1. Assign as background reading the WWW pages on "Threatened and Endangered Species Recovery."

2. Review the list of endangered wildlife and plant species from the WWW pages. If students want to write or call a U.S. Fish and Wildlife Office for their region, addresses and phone numbers can be found in this lesson, page 372. Ask students to select a species from the list and gather information about its problems. Students will be assigned to write a report. Reports might include this information about the species:
    - past and present range and population
    - length of time it has been endangered
    - reasons it is endangered
    - actions currently being taken to improve its chances of survival
    - a list of agencies, interest groups, or others who are working on the problem. Who is contributing money to the effort?
    - activities that the student alone or the entire class might undertake to aid the species
    - ways in which good land management could slow down or prevent such losses
    - why it is important that this species survive?

3. Once students have each presented their reports, create a chart listing each of the species; length of time endangered; past and present range; past and present population; and outlook for survival. Add any other categories of information and analysis you and the students might find interesting. Look for trends. Find practical actions private citizens might take to assist in recovery of species, if they choose. Make these suggestions available to others in your community who might be interested.

4. Using the National Wilderness Preservation System Map, students can locate a Wilderness or Wildlife Refuge near their community. Ask students to contact a natural resource professional from that area to speak to the class on concerns regarding local threatened & endangered species recovery efforts. Students can conduct further interviews and research on a species in their state or bio-region, including:

- What areas have been set aside specifically for an endangered species?
- What species are already extinct?

Procedure continued:

5. Addresses/contacts of regional U.S. Fish and Wildlife Service Offices:

	Contact Info	States in Region
Region One	Eastside Federal Complex 911 N.E. 11th Ave. Portland, OR 97232 (503) 231-6118	California, Hawaii, Idaho, Nevada, Oregon, Washington, American Samoa, Commonwealth of the Northern Mariana Islands, Guam and the Pacific Trust Territories
Region Two	P.O. Box 1306 Albuquerque, NM 87103 (505) 248-6282	Arizona, New Mexico, Oklahoma, and Texas
Region Three	Federal Bldg. Ft. Snelling Twin Cities, MN 55111 (612) 725-3500	Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin
Region Four	1875 Century Blvd., Suite 200 Atlanta, GA 30345 (404) 679-4000	Alabama, Arkansas, Louisiana, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Florida, Tennessee, Puerto Rico, and the U.S. Virgin Islands
Region Five	300 Westgate Center Dr. Hadley, MA 01035 (413) 253-8659	Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia
Region Six	P.O. Box 25486 Denver Federal Center Denver, CO 80225 (303) 236-7920	Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming
Region Seven	1011 E. Tudor Rd. Anchorage, AK 99503 (907) 786-3542	Alaska

Evaluation / Follow-up / Extension

- Evaluate research skills and written reports.
- Ask students to design a hypothetical animal or plant with characteristics that favor extinction. How do the traits of this species compare with those of any real animals or plants? Repeat, except design a species that could resist extinction.
- Students can generate a list of ways they can help recovery efforts for threatened and endangered species and select projects to pursue.
- For additional lessons and activities that compliment this lesson, see other Science lessons, and "Conservation Biology, A Curriculum for High School Students," and "Conserving Greater Yellowstone, A Teacher's Guide."

Career Options:

wildlife biologist, conservation biologist, natural resource land manager, research scientist

References:

- Lesson adapted from Project Learning Tree, "Endangered Species."
- *Wilderness Management*, John C. Hendee, George H. Stankey, and Robert C. Lucas

SCIENCE
Biology Connections

The following resources can be accessed through the U.S. Fish and Wildlife Service, Endangered Species Home Page (http://www.fws.gov/~r9endspp/endspp.html).

1. An explanation of the endangered species recovery process, found by scrolling down the E.S. Home Page to:

SPECIES

Recovery

***Questions and Answers**

2. The current list of endangered species listed by animal types and plant types, found by scrolling down to:

SPECIES

Listed Species
- *U.S. Species Indices
  - o Vertebrate Animals
  - o Invertebrate Animals
  - o Flowering Plants
  - o Non-flowering plants

3. Other material needed is the map of the National Wilderness Preservation System.

LESSON 5 • **Geology: Shaping Landscapes**

Objectives:
Students will:

- identify different landforms and explain how they are formed and changed with time.
- understand the role climate plays in shaping landforms.
- understand and identify how climatic conditions affect soils, vegetation, and wildlife.
- locate and map landforms found within state or regional Wilderness.
- determine how human actions affect local or regional geography.

Background:
Ecosystems include both living, **(biotic)** and nonliving, **(abiotic)** components. Biotic communities contain all living organisms within an ecosystem. Abiotic factors in an ecosystem include climatic conditions such as temperature, moisture, rocks and water. Landforms are the result of **internal processes** such as volcanism, shifting of plates, and uplifting; and, **external processes** like weathering and erosion caused by wind, running water and ice.

Weathering processes, which are all the processes that break down rocks at the Earth's surface, may be divided into two groups, **physical/mechanical** and **chemical**. Both processes incorporate considerations of: **atmosphere** (climatic influences of weather), **hydrosphere** (ground water, oceans, lakes, rivers, streams and cycling); and the **lithosphere** (chemical composition and physical make up of soils and rock materials).

The Earth's surface is the result of **destructional processes** tearing down the land, and **constructional processes**, building it up. **Destructional processes** include; weathering, the in-place breakup of rocks by physical or chemical means; and erosion, which involves the transport of Earth materials from one place to another by moving water as steams, rivers or along coasts, wind, glacial ice, and gravity. **Constructional processes**, include plate tectonic activity that raises the land to provide, with volcanism, more fuel for destruction; and deposition, the laying down of sediment derived by weathering and carried by moving water, wind, and glacial ice.

Climatic conditions play a substantial role in shaping landforms. The resulting landform is made up of various rock and soil types, plant and animal species and human inhabitants which are adapted to a specific region. Vegetation communities dictate species composition which are a function of the ecological conditions within an ecosystem. Species composition is dictated by available moisture, soil porosity and permeability. Vegetation dictates which wildlife species can live in the ecosystem.

Background continued:
Wilderness areas contain a variety of landforms from deserts to mountains. These land forms are the result of variable climatic conditions. Many geologic processes can be studied in Wilderness areas, untouched and uncovered. Humans benefit from preservation of Wilderness as an outdoor study lab.

In the following activities students will learn how to identify different landforms and understand the processes that shape them.

Activity 1: Identifying Landforms

Materials:

- student handout: "Shaping the Landscape", page 383.
- Fundamentals of Geologic Processes illustrations, pages 381-382.
- aerial photographs in "Contours Stereogram Book"
- stereoscope

Duration: 1 class period

Location: classroom

Procedure:
1. Review fundamentals of geologic processes. Read the background section and supplement with Student Handout: "Shaping the Landscape". Make overhead transparencies of the geologic processes illustrations to use as a visual aid.

2. In small working groups, assign students to study aerial photographs with stereo glasses to identify different landform types. Stereo glasses can be purchased in scientific supplies catalogs or perhaps borrowed from the city or County Planning Office, the State Foresters Office or the US Forest Service. Provide instruction in using stereo glasses if students are not familiar with them.

3. Ask students to identify prominent landforms in aerial photographs. What is the climate like? How does climate affect soils (determined by availability of moisture and the soil's ability to retain moisture)? Look at vegetation associated with each landform. How do climatic conditions affect vegetation representing each landform? List wildlife species you might find within each landform region. Why would these species choose to live here?

Activity 2: Natural Landforms, What Relief!

Materials:
- U.S. raised relief map
- world relief map of landforms

Duration: 1 - 2 class periods

Location: Classroom

Procedure:

1. Divide students into small working groups. Ask each group to identify four major landforms (such as mountains, deserts, canyons, valleys, rivers, shorelines, volcanoes, etc.). Locate and list each landform at different locations in the U.S. Why does the same landform (located in different parts of the U.S.) have different vegetation and wildlife?

2. Ask students to identify and describe the regional geography where they live. Have students hypothesize how climatic conditions contribute to resulting soil types, vegetation, and wildlife species.

3. In one paragraph, ask students to summarize the usefulness of each landform to humans. What role does Wilderness play in preserving that usefulness?

4. Examine landforms and vegetation zones on the world map. Ask students to explain why deserts are located where they are. Temperate or tropical rainforests?

Supplemental
Activity 3: Branching Out: Take a Look at Landforms

Materials:
- research materials
- art materials: colored pencils or markers, posterboard
- world map

Duration: up to one week, possible homework
Location: classroom and library

Procedure:

1. Assign one landform per student or working group from landforms list.
2. Assign each student to research his/her landform and write a paragraph summary about what it is, how it formed, and why it is unique.
3. Ask each student to draw a picture to illustrate the information. It can be a picture of the landform itself or of something related to the landform, such as vegetation and wildlife species living near or on it.
4. Display the pictures and information on a map of the world. Make a border around the map with pictures and summary paper and attach each one to its exact location.

LANDFORMS IN THE UNITED STATES:

Adirondack Mountains
Black Hills
Cape Cod
Grand Canyon
Mammoth Cave
Mississippi Delta
Niagara Falls
Sierra Mountain Range
Appalachian Mountains
Bryce Canyon
Devil's Tower
Great Plains
Mauna Loa
Mount St. Helens
Everglades
Mt. McKinley

LANDFORMS AROUND THE WORLD:

Alps or Matterhorn in Europe
Andes Mountains in South America
Azores in the North Atlantic Ocean
Highlands of Northern Scotland
Hsi Chiang River Delta in China
Indus River in India
Lake Baikal in the Soviet Union
Marianas Trench in the Pacific Ocean
Mount Fuji in Japan
Mount Vesuvius in Italy
Rift Valley in Africa
Southerland Falls in New Zealand
White Cliffs of Dover in England
Amazon River in Brazil
Ayers Rock in Australia
Giant's Causeway in Northern Ireland
Himalayas or Mount Everest in Asia
Iceland in the Atlantic Ocean
Island of Surtsey in the North Atlantic
Nile River in Egypt and Ethiopia
Mount Etna in Italy
Mount Kilimanjaro in Tanzania
Pyranees Mountains in Spain and France
Rock of Gibraltar off the coast of Spain
Victoria Falls in South Africa
Yukon River of Alaska and CanadaYangtze

Credit: Naturescope, Geology: The Active Earth, National Wildlife Federation

Supplemental
Activity 4: Geology of Wild Places

Materials:
- U.S. raised relief map
- National Wilderness Preservation System Map.

Duration: 1 - 2 class periods, possible homework

Location: classroom

Procedure:

1. In small groups, ask students to identify and locate a Wilderness or National Park in their state or region.
2. Identify and list landform types, specific geologic features, soil types, vegetation, and wildlife unique to this Wilderness. Describe climatic conditions and weather patterns of the area.
3. Create a map of the area portraying all factors students identified in step 2. Students must plan how they will represent each feature (overlays, color-coded, symbols, computer generated, satellite maps).
4. Display maps in the classroom and ask each group to present the geography and geology of the Wilderness or National Park.
5. As an extension, ask students to locate and describe landforms represented in National Parks in their state, region, nation, or other parts of the world.

Evaluation / Follow-up / Extension:
- Evaluate student mapping projects and lab exercises.
- What areas were the most impassable or unfriendly to human habitation? What areas were settled? Why? Are they now parts of designated Wilderness?
- Where are other Wilderness areas found? What environmental or geologic factors and events are present that identified them for preservation?
- Invite a natural resource professional or geographer to present to your class on the Geographic Information Systems (GIS) using satellite imagery for mapping landforms. Ask the speaker to address how GIS can assist in Wilderness management.

Career Options:
geologist, geographer, cartographer, hydrologist, meteorologist, engineer, landscape architect, Wilderness manager, environmental educator

SCIENCE
Ecology; Earth Science; Geology

References:

- Cvancara, Alan M. *A Field Manual for the Amateur Geologist,* Revised Edition. New York, NY: John Wiley & Sons, Inc. 1995
- Scherrer, Wendy and Weisberg, Saul, ed. *Living With Mountains, A Guide for Learning and Teaching About Mountain Landscapes*, Sedro Woolley, Washington: North Cascades Institute. 1991.
- Braus, Judy, et. al. *Naturescope, Geology: The Active Earth.* Washington, DC: National Wildlife Federation. 1987.

Science, Page 381

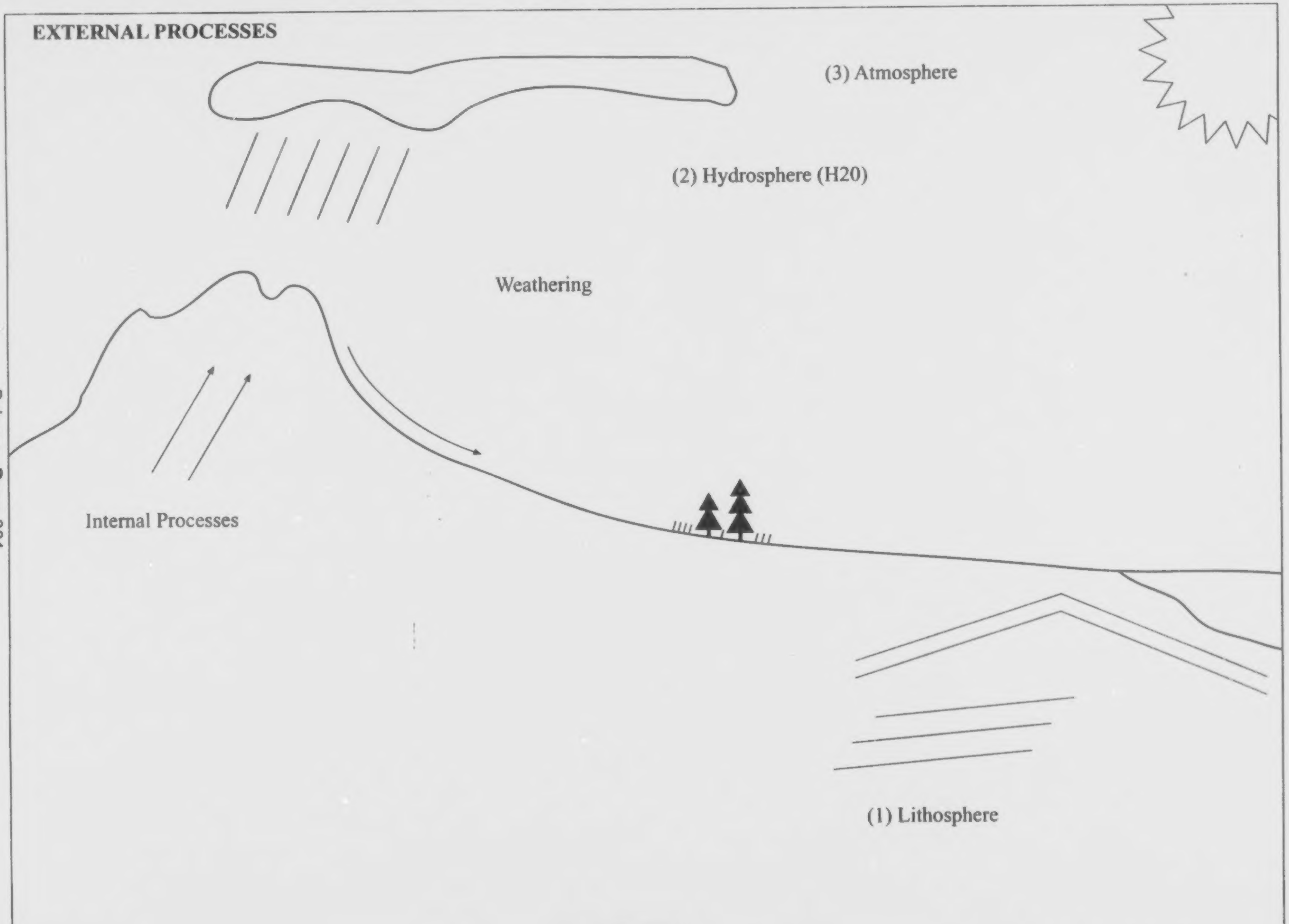


Figure 1

Science, Page 382

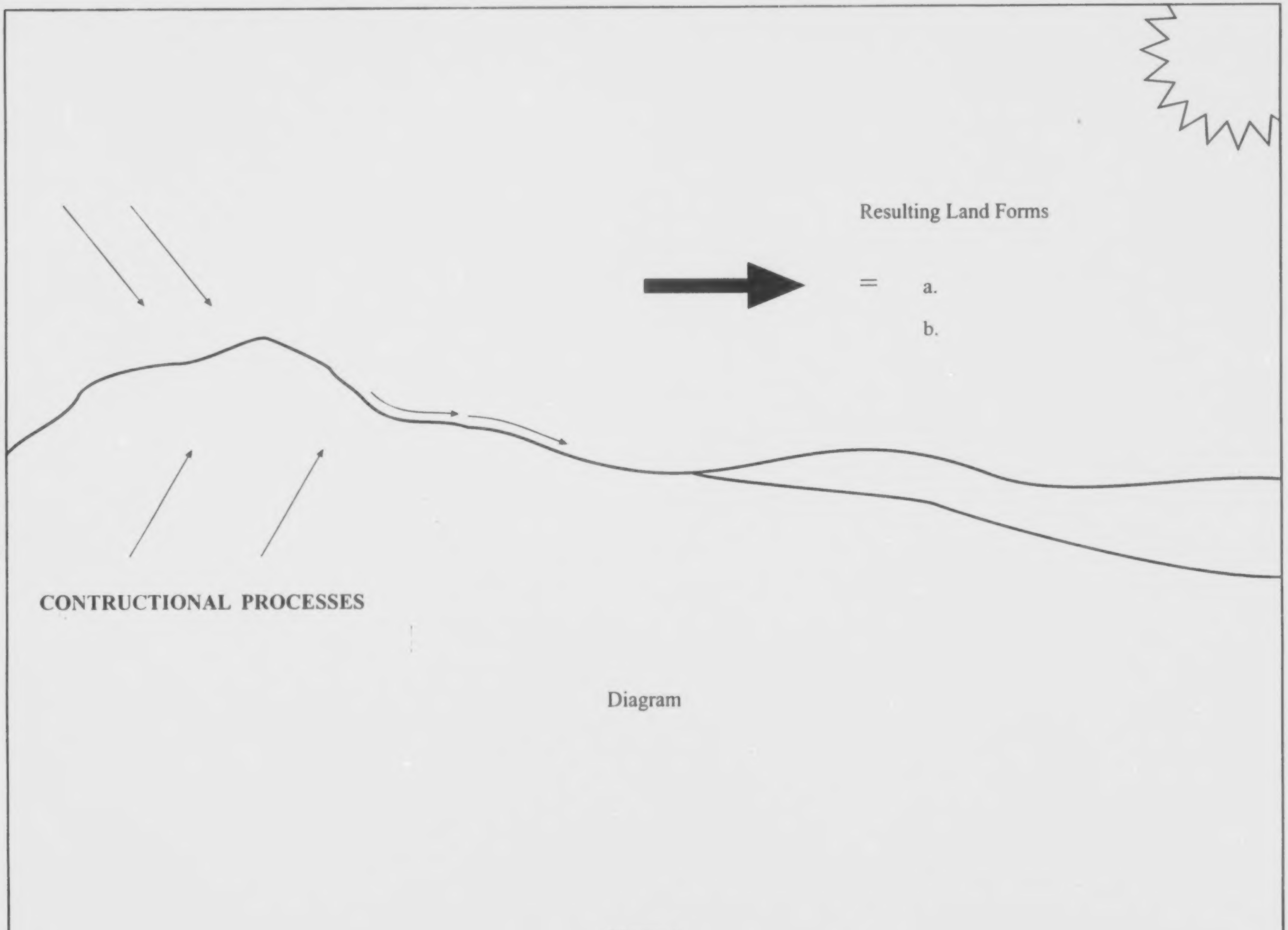


Figure 2

Activity 1: Identifying Landforms

STUDENT INFORMATION HANDOUT

Shaping the Landscape

DESTRUCTIONAL PROCESSES: "The Wear-It-Down Forces"
Two forces, weathering and erosion, are constantly at work building up and moving rocks making up the Earth's crust. **Weathering** causes rocks to fragment, crack, crumble, or break down physically and chemically. **Erosion** loosens and carries away the rock debris formed by weathering. Over time these two forces, working together, change the shape of the land.

As Rocks Crumble: Weathering
All rocks weather, but not in the same way or at the same rate. It all depends on the mineral composition where the rock is located and the local climatic conditions of temperature and moisture. Here's a look at the ways rocks weather:

- **The Freeze and Crack Cycle:** When water seeps into cracks in rocks and freezes, it can force a rock to split. That's because when water freezes it increases in volume. And because it needs more room, it pushes against the rock, eventually causing it to break apart. This is called ice wedging. If freezing and thawing occur over and over again, "solid" rocks can eventually be reduced to rubble.
- **The Roots of Destruction:** Plants do their share of breaking up rocks. (For example, plants can grow in the small bits of soil collected in rock cracks formed from ice and chemical action.) As the plant's roots develop, they expand, and apply pressure to the rock, forcing the crack to widen and deepen. Eventually, roots can split apart rocks, even large boulders and pieces of bedrock.
- **The Chemical Breakdown:** Some minerals are changed into different minerals as they react with chemicals in air and water. But not all minerals react in the same way and some, such as quartz, are very resistant to break down. For example, when iron is exposed to oxygen in the Earth's atmosphere, it changes chemically into iron oxide, or rust. Other minerals, such as pyrite, form weak acids when dissolved in rainwater, and these assist in the decomposition of rock material.

Soil is Important Stuff: There's a big benefit to weathering; a result we couldn't live without. As rocks are continually broken down into smaller and smaller bits, they eventually get so small the particles become fine enough to be called silt or sand, two important ingredients of soil. Although soil is mostly made up of tiny rock fragments, it also contains decayed plant and animal material (called humus), such as rotten leaves and decomposed animal parts. Rock and organic materials provide the nutrients needed for plant growth.

Activity 1: Identifying Landforms

STUDENT INFORMATION HANDOUT

Shaping the Landscape

Water, Wind, and Ice on the Move: Erosion
Raindrops falling on a field in Iowa, a glacier scraping out a valley in the Alps, and blowing sand into dunes along a beach or in the Mohave Desert are all examples of erosion at work. Erosion continues the work that weathering starts by helping to loosen particles and by transporting weathered rock material. The main agent of erosion is running water. It probably does more to wear away land than all other geologic agents combined. But ice and wind are also important landscape sculptors.

Eroder #1: Water
Water, Water, Everywhere: A fast-flowing stream carries a lot more than water. Clay, sand, silt, pebbles, and even boulders are sometimes carried along with the current. As these pieces of rock are carried along, they carve out a variety of different landforms, from stream valleys to mesas.

Underground H20: Some of the precipitation falling on the Earth's surface eventually seeps into the ground becoming **groundwater**. Groundwater can remove underground limestone bedrock by dissolving it and slowly carrying it away. Very weak acids in the water "eat away" at these rocks, often producing underground caverns. Some caverns get so big their ceilings collapse, forming depressions on the Earth's surface called **sinkholes.**

Coast Carvers: Moving water also shapes coastlines of continents. As powerful waves carrying rocks and sand pound against land, they can cause extensive erosion, forming rugged cliffs, arches, and coastal caves.

Eroder #2: Wind
Sand in the Face: Wind by itself isn't much of an erosion agent. But high-speed wind carrying a load of silt and sand is. Wind erosion is responsible for forming a variety of landscape features, especially in desert areas. (Deserts usually have few plants to hold sediment in place with their roots.) Wind erodes by lifting and removing sediment, but it can pick up only very fine, dry particles, sand size and smaller. Wind carrying sand can also sandblast rock and is responsible for many of the towers, pinnacles, and polished bedrock in desert landscapes.

Eroder #3: Ice
A Slice of Ice: In a few places, the climate is so cold most precipitation falls as snow in these areas and more snow accumulates than melts each year. As the snow piles up hundreds of feet thick, it presses down on the bottom layers until the snowflakes are pressed tightly together. Over time they become interlocking ice crystals and form a huge sheet of solid ice called a glacier.

Activity 1: Identifying Landforms

STUDENT INFORMATION HANDOUT

Shaping the Landscape continued

Eventually, the solid mass of ice starts to "flow" slowly downhill. This motion, usually just a few inches per day is due to two processes. First, the layers of ice that make up a glacier start to slide over one another. Then, the ice at the very bottom of the glacier, where pressure is greatest, starts to melt. The thin layer of water forming beneath the glacier allows the ice to slide very slowly over rocks and soil.

Giant Ice Scrapers: As a glacier travels, it plucks out chunks of bedrock which become embedded in the ice. These fragments of rock help grind and gouge the land as the glacier keeps moving. Glaciers scrape out a variety of landforms from steep peaks, such as the famous Matterhorn in the Alps, to U-shaped valleys and narrow ridges.

Ice Ages Gone By: Glaciers from past ice ages shaped many of the landscape features we see today, including many of our northern lakes, hills, and valleys. The last Ice Age ended about 10,000 years ago as the ice sheets covering the northern part of North America, Europe, and Asia slowly melted. As the ice sheets retreated, they left sharp mountain peaks, deep valleys, huge boulders (called "erratics" because they are out of place), scratched rock surfaces, piles of rocky debris, and other evidence that glaciers had once covered the land. The melting of ice sheets also caused the sea level to rise and re-cover the continental shelves adjacent to the continents.

CONSTRUCTIONAL FORCES: THE "BUILD-IT-UP" FORCES

As weathering and erosion wear away the Earth's crust, other forces are constantly at work building it up. Most of the building-especially the "big stuff," is the result of plate tectonics. Mountains, volcanoes, and faults are formed as rocks are pushed up, warped, folded, or fractured. Examples of mountain building include the Cascades, Andes, Himalayas with plate margins caused by plate tectonics. The build-up, or deposition, of sediment creates new landforms. And just like weathering and erosion, deposition is an ongoing process.

Move It and Dump It: Most of the sediment cut from mountains by weathering and erosion is carried and dumped by flowing water and most of it eventually ends up in an ocean. For example, every day the Mississippi River dumps over two million tons of sediment into the Gulf of Mexico. But some of the sediment carried by wind, water, and ice ends up in other places too, such as at the bases of mountains (forming alluvial fans), along river and stream banks (forming flood plains), and at the retreating edges of glaciers (forming huge piles of rock, rounded hills, and other landscape features). Deposition also forms dunes, beaches, and other landforms.

Activity 1: Identifying Landforms

STUDENT INFORMATION HANDOUT

Shaping the Landscape

continued:

The Layered Landscape: Over the years, sediment deposited in oceans by rivers, and streams piles up, forming layers of sedimentary rock as the sediment is compressed. Geologists study sedimentary layers to find out more about the ancient environment and past lifeforms that lived in an area. For example, if sedimentary rock layers are not turned upside-down by the shifting of the Earth's crust, geologists know the oldest fossils will be found in the lowest rock layers and the youngest fossils will be found in layers closer to the Earth's surface.

PEOPLE SHAPE THE LANDSCAPE

So many forces are at work on the Earth's crust at the same time, it's often hard to figure out which geologic agents are responsible for what you see. But some landscape features are not caused by geologic forces at all. They're caused by people. We speed up erosion by clearing land for farming, housing developments, lumbering, and strip mining; we change the course of rivers by building dams and channels; and we cut through mountains of rock to build highways.

All these, as well as other human activities, affect the natural processes of weathering, erosion and deposition. It is important that we try to understand the effects of our activities on the landscape, plant life, and animal life so we can judge the longer term effects and appropriateness of our activities.

The past and present forces of nature affecting the Wilderness landscape capture the need to protect geologic laboratories. Wilderness is the place where we can go to study changes occurring over time. Much of our landscape has changed due to human presence and expanded development. If we can comprehend what has happened over time, we will continue to cherish the power of nature and the need to protect and preserve these wild areas - for future generations.

Aldo Leopold, noted wildlife biologist and leader of the Wilderness idea stated, "Land, then, is not merely soil; it is a fountain of energy flowing through a circuit of soils, plants, and animals. Food chains are the living channels which conduct energy upward; death and decay return it to the soil. The circuit is not closed; some energy is dissipated in decay, some is added by absorption from the air, some is stored in soils, peats, and long-lived forests; but it is a sustained circuit, like a slowly augmented revolving fund of life."

• **Credit:** Adapted from Naturescope, Geology: The Active Earth, National Wildlife

SCIENCE
Ecology; Earth Science; Geology

Lesson 6 • A Source of Fresh Water—Wilderness Watersheds

Objectives:
Students will:

- understand common U.S. Geological Survey map symbols including contour lines.
- choose a river and trace its tributaries upstream to the headwaters and its source(s).
- identify watershed basins for the river they have chosen.
- list and explain three factors which can affect water production and quality before it reaches developed urban or farm areas.
- explain why Wilderness areas are considered important sources of fresh water.

Duration: 1 to 2 class periods

Location: in the classroom

Background:
Wilderness areas often encompass water drainage areas know as watersheds. Mountains, and the valleys and basins that they surround, drain water toward the lowest point, which may be a lake or a river that continues to flow down to the next collection area. These water collecting areas are often the source of fresh water for human uses of all kinds.

Not only do we need sources of fresh water to drink, but we use fresh water in almost everything we do. All plants and animals require fresh water. Water is the medium of all life processes. It transports nutrients as it flows through soil and living matter. Water also removes and dilutes many natural and artificial wastes. A watershed includes the mountains and hills upon which rain and snow fall, the streamlets that the water "sheds" into, the rivers that collect the water of the streamlets, etc. It is the rivers that people often think of when considering water conservation practices such as dams, canals, and reservoirs.

We need to expand our thinking to the source - the headwaters of the streams; the basins and valleys that drain into them. It is important to realize that our supply of fresh water is based on the intricate workings of a healthy ecosystem.

- The oceans hold 97 percent of the Earth's water.
- Less than 3 percent of the Earth's water is fresh and most of that is frozen in the North and South poles.
- At any given time, only 0.03 percent of the Earth's water is flowing in streams or river channels readily available for human use.

Background continued:

- Most of the Earth's fresh water is underground. Groundwater fills the spaces between sand an gravel particles, or cracks in bedrock. It collects in aquifers. People sink wells into these aquifers to pump water out for drinking, irrigation and industrial use.
- Water from rivers and runoff often travels through layers of sand and gravel to recharge the aquifers, renewing the underground water supply. The quality of water from an aquifer is partially dependent on both the quality of water in the river, and the integrity of the watershed that supplies it.
- Activity 1 and 2 can be used to teach map reading skills if students have not learned these skills, or use them as a quick review and refresher before doing Activity 3. Activity 3 will apply map reading skills to identify a watershed on topographic map.

Activity 1: Map Symbols Bingo

Background:

Map reading skills are some of the most challenging outdoor skills to learn, but they can be among the most satisfying. As with other elements of the Wilderness and Land Ethic Box, these activities are not intended to be a comprehensive curriculum in orienteering, but rather, a basic introduction to those map reading skills that will be most useful in beginning wilderness travel. A map is "a reduced representation of a portion of the surface of the Earth" (Kjellstrom, 1976, p. 8). A topographic map is a map that shows the three dimensional features of the land's surface in two dimensions. "Topos" = place; "Graphein" = to write or draw (Kjellstrom, 1976). Where to purchase maps - U.S. Geological Survey, and local outdoor and sporting goods stores.

Materials:

- Topographic maps
- One copy of the Map Symbols legend, page 393
- Map worksheet, pages 397-401
- Scissors
- Rulers
- Paper, pens
- A hat or other container for bingo symbols

Procedure:

1) Prior to the beginning of the activity, cut up one set of symbols to be drawn out of a hat in the bingo game.

Procedure continued:

2) Introduce the **Topographical maps** by dividing students into groups, giving each group a map to look at. Ask them to tell you what they notice about this map that is different from others they have seen. Some will mention the funny brown squiggly lines, but others may point out the small pictures of bicycles, tents, or dashed lines. Highlight the symbols list on the front of the map, and go through the symbols one by one, so that students focus on them enough to learn what they stand for. Have them try to find examples of some symbols on the map itself.

3) Now it is time to play Bingo. Each student will need to draw a "bingo card", four boxes wide by four boxes tall, on a piece of paper. Each student should cut out individual pictures of all the map symbols, and place any 16 in any order in the boxes, one in each box. No fair attaching the name of the symbol to the picture. The point is to learn what the symbols stand for! If you think cheating may be a problem, students can glue symbols onto boxes.

4) Select symbols randomly out of your hat in the front of the room, and read off the name of the symbol, e.g., "mountain bike route", "Wilderness boundary", or "unsurfaced road-high clearance". Students mark an "X" over that symbol on their card. The winner is the first to correctly identify four symbols in a row. You might wish to play several rounds, or continue playing until everyone wins. Debrief at the end by asking if there are any symbols that anyone is still confused about.

Evaluation:

- Test students on defining each map symbol they have learned about in the Bingo game, or use the enclosed map worksheet with a map, and evaluate.

Activity 2: Reading the Land - Contours!

Materials:

- Topographical maps
- Contour lines worksheet and quiz, pages 398-401

Procedure:

1) Show students the topographic maps again, and remind them about the brown squiggly lines. Explain that contour lines are lines that represent elevation. In other words, if a person were to walk along such an imaginary line, she would never climb or go downhill. It would always be level or flat. Contour lines are a way of illustrating three-dimensional changes in topography, such as mountains and valleys, on a two-dimensional picture--a topographical map.
2) Distribute the topographic maps to small groups. Ask students to examine mountains, cliffs, ridgelines and valleys. Ask them to describe which way streams are flowing. Trace a stream all the way from its source to its exit off the map.

Evaluation:

Photocopy a section of a topographic map with a variety of land features. Ask students to label five to ten land features. Hand out the Contour Lines worksheet, page 376, and the Contour Line Quiz, page 399, following this lesson.

SCIENCE
Ecology; Earth Science; Geology

Activity 3: Mapping a Watershed

Materials:

- map of a Wilderness in your region or topographic maps of the area
- overhead transparencies of river drainage areas, make copies from pages 400-401
- several highlighter markers
- copies of student handout "Watershed," page 392— or put handout questions on an overhead or chalkboard
- copies of one or more river drainage areas—one for every two to three students, pages 400-401

Procedure:

1. Locate a map of the Wilderness nearest your school. Select a river or creek drainage, make copies for the students and overhead transparencies.

2. Introduce the topic of the lesson and the objectives. Using the overhead transparency show students how to determine the origin of the above ground water that comes from a Wilderness or other public land area.

3. Using a highlighter, find where the river is large and obvious. Find where it leaves the Wilderness. Begin to trace back upstream to the sources of the river. Highlight the lines representing rivers, streams, seasonal streams and streamlets as far as indicated on the map. Include all branches that are directly feeding the major river, i.e. trace all of the tributaries that flow into the river. See the example from the river drainage area student handout, page 392.

4. After highlighting all of the tributaries, go back to the map and identify the highest points around the area you have highlighted. Connect the tops of the ridges and mountains that surround the areas that contain your highlighted streamlets. The drainage for the river you have chosen is the land mass you have outlined. This entire area is the watershed for that river.

Discuss the following questions with the students:

- Estimate how many square miles this area covers
- Where does the snowmelt and rainwater go?
- What towns or farms or other developed areas depend on this water? If not readily apparent, trace where your river travels—does it lead to another river, lake or reservoir that is an important source for humans?
- What is the topography of this watershed?
- What types of ground cover are there?

Ask students to repeat the exercise using the photocopied maps and handouts.

Follow-up:

Discuss the students' answers to the questions from the Student Handout "Watershed."

Evaluation:

- You may evaluate the students on their participation, successful completion of their handouts, thoroughness of their identification of all of the drainages on their map.

Extension:

- Ask students to trace the origins of the water which is used in their home. This can include who the suppliers are, where their reservoirs or aquifers are, is there a different supply when levels drop in the winter, etc.
- Ask students to research the management of a local river or watershed. Find out how much water is removed for human purposes and what effects it has on downstream ecosystems.
- Have students map human settlement in their region - what habitat do humans prefer?

Career Options: hydrologist, forester

References:

- "The Clark Fork Watershed Education Program," Missoula County Conservation District 1991.
- "Understanding the Game of the Environment," USDA Forest Service Agriculture Information Bulletin No. 426 Washington, D.C. 1979.

Activity 3: Mapping a Watershed

STUDENT HANDOUT • **WATERSHED**

Directions:

1. Using a highlighter, find where the river is large and obvious. Find where it leaves the Wilderness or National Forest. Begin to trace back upstream to the sources of the river.
2. Highlight the lines representing rivers, streams, seasonal streams and streamlets as far as indicated on the map. Include all branches that are directly feeding the major river, i.e. trace all of the tributaries that flow into the river and all of the tributaries that flow into them. See the example given.
3. After highlighting all of the tributaries, go back to the map and identify the highest points around the area you have highlighted.
4. Connect the tops of the ridges and mountains that surround the areas that contain your highlighted streamlets. See the example.

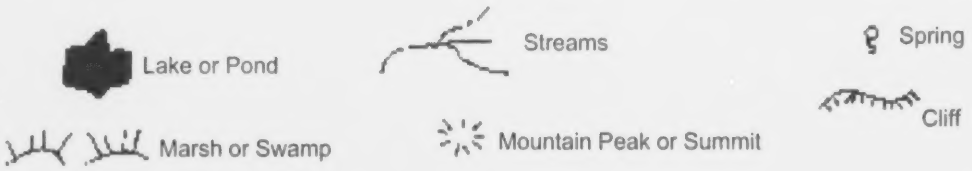
The drainage for the river you have chosen is the land mass you have outlined.
This entire area is the watershed for that river.

Answer the following discussion questions:

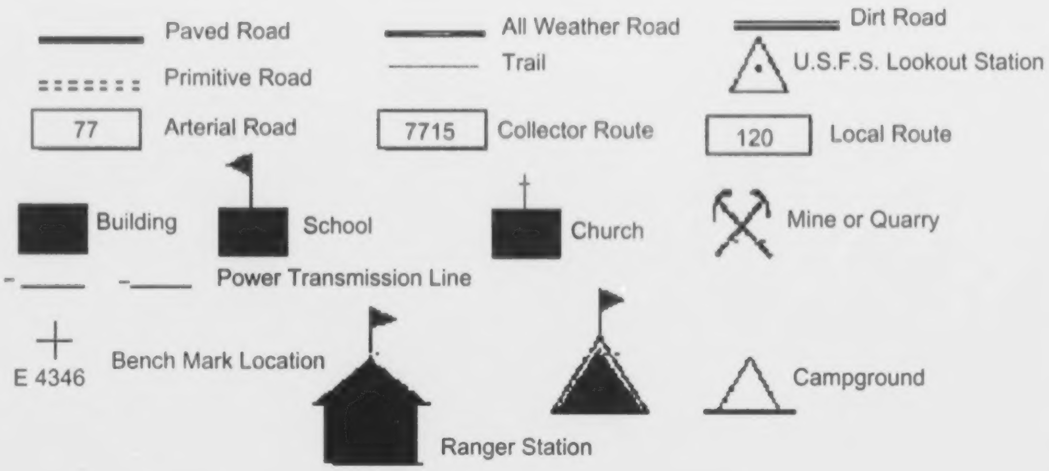
1. In general, are drainage areas measured in square acres or square miles?
2. For your drainage system (watershed), what is the primary source of water: rain or snow? Where does the water from your watershed end up? What is it used for?
3. Why do we take so much interest in the snowpack measurements we hear about in the news? (They are most often talked about in the early spring.)
4. How would a winter season with little snowfall affect people later in the year?
5. How would a forest fire in the fall affect the spring melt and subsequent water supply?
6. Why are water rights so strongly fought over whenever an area is being considered for inclusion into the Wilderness system?
7. Consider areas that have been developed by humans. After a strong rain there seems to be more water than our drainage systems can handle. Is this water suitable for us to use? Why? What needs to be done before it can be used? Where does the water end up after draining off your school and moving down the street? Is it recharging the aquifer? Can you think of alternatives to channeling rain water away from developed areas? How does the controlled flow of runoff in a developed area differ from runoff in a natural area?
8. Is the treated water from our gutters just as usable as the water from natural areas?
9. Do we need to preserve natural areas where rain and snow can accumulate?

MAP SYMBOLS

Natural Resources



Human-Made Improvements



MAP INFORMATION SHEET

1. Map Margin Information

Identify each of the following:

- A. Name of the map
- B. Names of adjacent maps
- C. Location of the map on the earth's surface
  - i. Longitude, note meridians
  - ii. Latitude, note parallels
- D. Date of the map – Note possible changes that may have occurred since the map was drawn and field tested.
- E. Map scale/series – Note how the scale is drawn.
  - i. Scale ratio
    inches/cm. on map = inches/cm. in the field
    - a. 1:24,000
      This map is good for detailed study of a small area.
      1 inch = 2,000 feet in field
      Approximately 2½ inches = 1 mile
      1 cm. = 240 m., 4 cm. = 1 km
    - b. 1:25,000
      Used in metric series, similar to 1:24,000 scale
      1 cm. = 250 m
    - c. 1:62,500
      Good general purpose map
      Approximately 1 inch = 1 mile in field
      1 cm. = 625 m., 1.5 cm. = 1 km
  - ii. Series
    - a. 15" (minute) series
      This map covers a section of the earth's surface 15" of longitude x 15" of latitude. Note longitude and latitude marks on map to confirm size.
    - b. 7½" series
      Note that it takes four 7½" maps to equal a 15" map.
    - c. 7½" x 15" series
      Metric series found only in a few areas of the United States

2. General Map Details

Identify the location of each detail on a sample map.

A. Map symbols
  - i. Cultural symbols – symbols of human-made objects. These are represented by the color black.
    - a. Roads
    - b. Railroads
    - c. Churches
    - d. Trails
    - e. Buildings
    - f. Cemeteries
    - g. Bridges
    - h. Schools
    - i. Quarries/mines
  - ii. Water symbols – represented by the color blue
    - a. Lakes
    - b. Streams
      - (1) On 7½" maps, for a stream width of more than 40 ft. (12 m.), both shores are shown.
      - (2) On 15" maps, for a stream width of more than 80 ft. (24 m.), both shores are shown.
    - c. Springs
    - d. Marshes/swamps
  - iii. Map directions
    - a. True north

      This is the north that is shown on a map.
    - b. Magnetic north

      This is the north that attracts the compass needle. Subsequent navigation lessons ("Compass: An Introduction" and "Combining the Map and Compass: An Introduction") will discuss the two norths and declination in more detail.
    - c. Place name designations

      Note the different styles of lettering used for area names, elevation figures, political boundaries.

B. Elevation markings – These are represented by the color brown.
  - i. Contour lines

    "An imaginary line on the ground along which every point is at the same height above sea level" (Kjellstrom, 1976, p. 23). Note the altitude numbers located along some contour lines.

a. Index contour

Heavier brown contour lines usually spaced at 100 ft. elevation intervals

b. Intermediate contours

The contour lines between index contours

c. Contour interval

The distance in height between one contour line and the one next to it (Kjellstrom, 1976, p. 23). Intervals vary from map to map.

d. Contour shapes

(1) Hills & mountains

(2) Passes

(3) Steep areas

(4) Flat areas

e. Depression contours

f. Interpreting elevation change

(1) Contours forming V's generally point uphill.

(2) Streams which come together forming V's generally point downhill.

g. Benchmarks

"BM" represents the location of a marker in the field where altitude or distance has been verified. The number next to "BM" indicates altitude.

WORKSHEET #2 - SCIENCE
Ecology; Earth Science; Geology

MAP OR SHEET

A. NATURAL FEATURES

1. Locate a river on the map.
   a. What is its name? _________________
   b. Name a stream flowing into it. _________________

NOTE: Dashed lines at the origin of a stream indicate that it has intermittent flow.

2. Identify:
   a. a spring _________________
   b. a lake _________________
   c. a mountain peak _________________
   d. a marsh or swamp _________________

A. HUMAN-MADE IMPROVEMENTS

1. On your 1/2" scale map, identify by number:.
   a. an arterial road _________________
   b. a collection road _________________
   c. a local road _________________
   d. a trail _________________

2. Identify by name:
   a. a campground _________________
   b. a bench mark location _________________

CONTOUR LINES

1. A contour line, by definition, is an imaginary line on the ground along which every point is at the same height above sea level.
2. The number on a contour line indicates elevation above sea level. Locate a contour line on Figure 2 and write it down ______________________. Write down the number of the contour line next to it ______________________.
3. The distance in elevation between one contour line and the one next to it is the **contour interval**. The vertical distance between the contour lines on Figure 2 is ____ feet.
4. Contour lines indicate elevation, slope steepness, level areas, tops of hills, saddles, and ridges.
5. When contour lines cross a river or stream, they take on a V-shape, with the point of the V pointing uphill.
6. Contour lines denoting a ridge of a hill become U-shaped, with the bottom of the U pointing downhill.

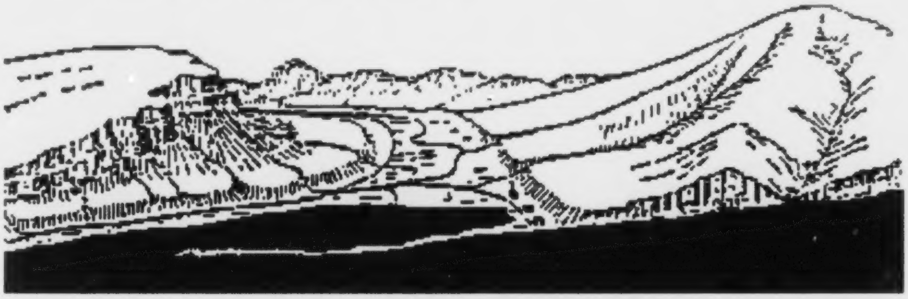


Figure 1 - A Landscape in Perspective

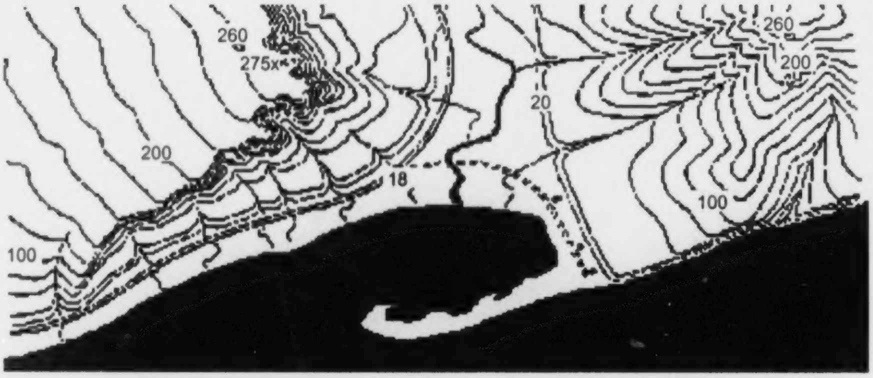
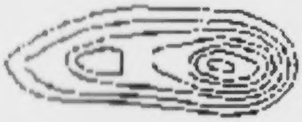
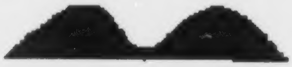


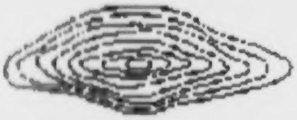
Figure 2 - The same landscape with contour lines.

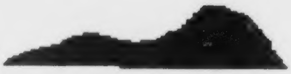
Contour Quiz

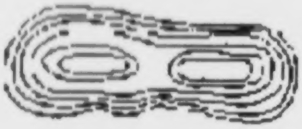
Match the profile (A-F) with the contour lines (1-6)

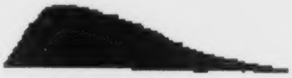
1


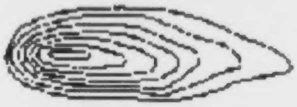
A


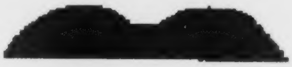
2


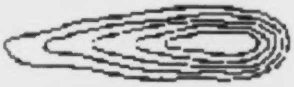
B


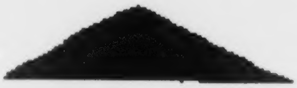
3


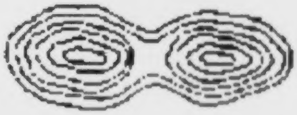
C


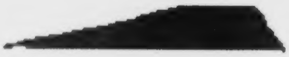
4


D


5


E


6


F


1. ______

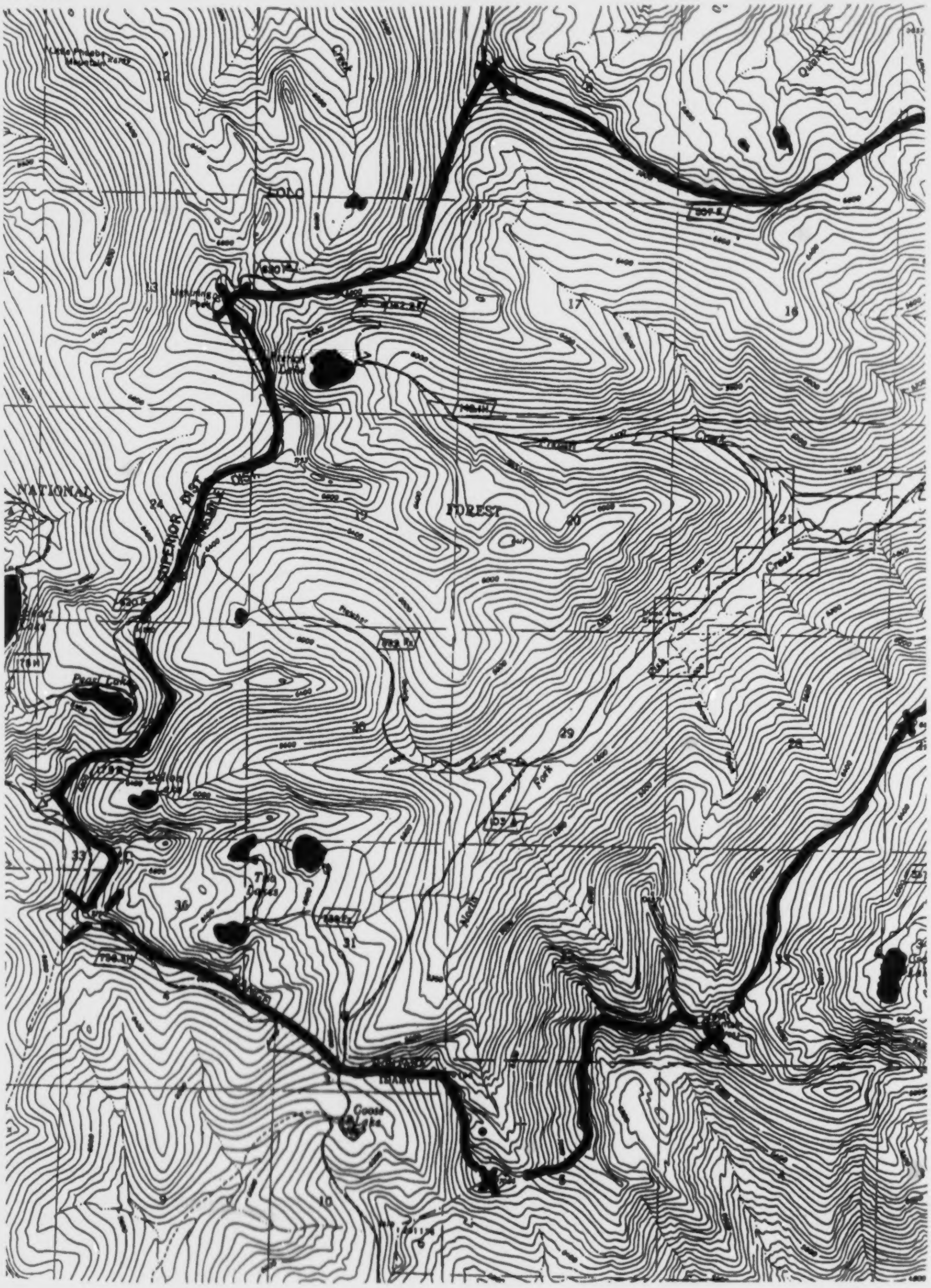
2. ______

3. ______

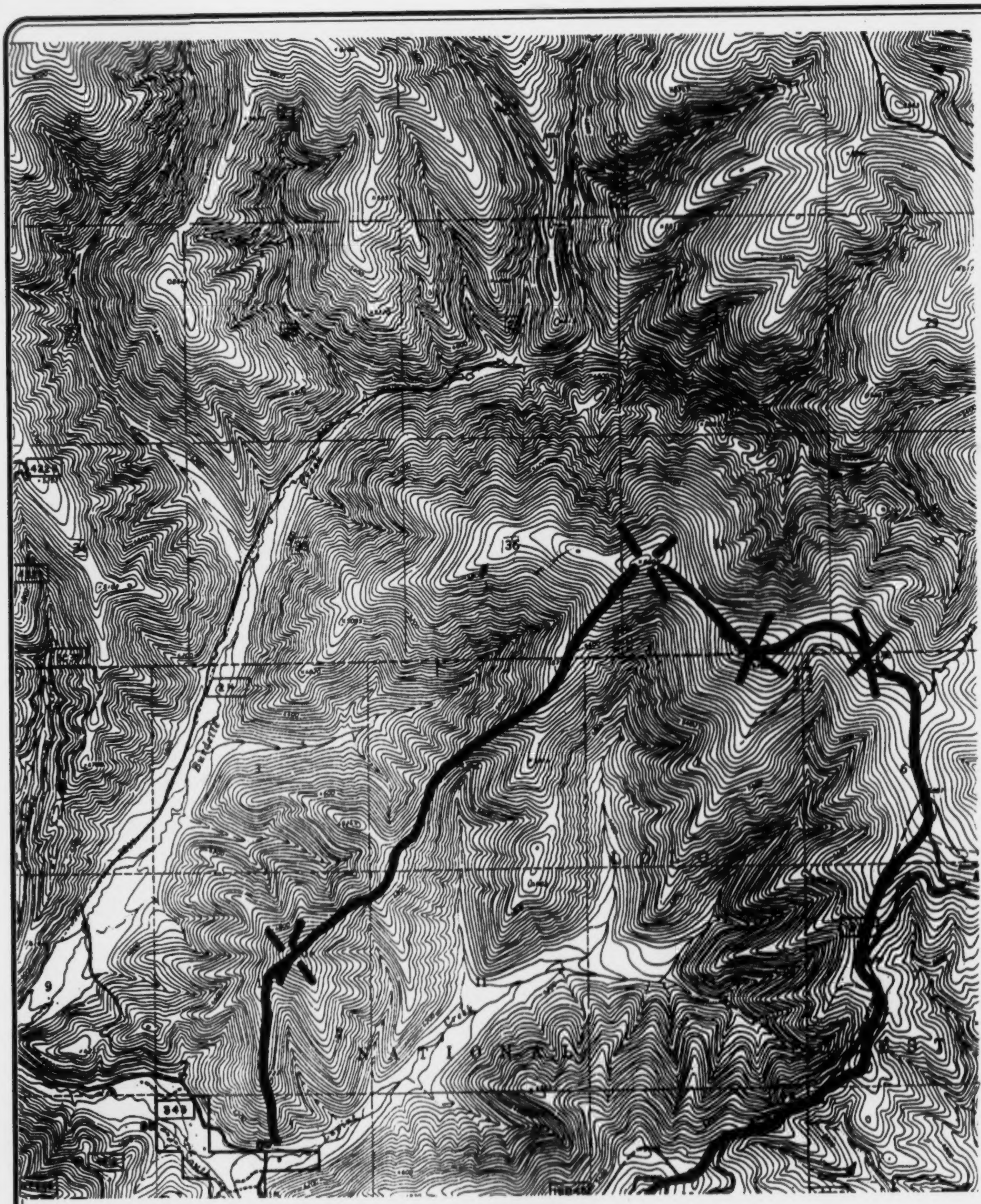
4. ______

5. ______

6. ______



BEST COPY AVAILABLE



BEST COPY AVAILABLE

SCIENCE
Ecology; Earth Science; Geology

Lesson 7 • **Air Quality**

Objectives:

Students will:

- understand how air pollution affects both humans and the landscape.
- define and collect particulate matter from air in test areas around the school, analyze and draw conclusions about airborne particulate pollutants.
- determine how buffering capacity of soils affects the susceptibility of an area to acid rain.

Background:
Air pollution is any visible or invisible particle or gas found in the air adversely affecting health and welfare. Air pollutants are produced by many natural sources such as volcanoes, decaying organic materials, forest fires, oceans, lightning, plants, and animals. In most cases, natural air pollution emissions exceed those that are human-caused. However, natural air pollution is usually widely dispersed, short term, and less toxic than human-caused pollution. During the last century human-caused air pollution has become a major concern. Urban areas, agri-business, and industry are all contributors to air pollution problems. Ozone, nitrogen dioxide, sulfur dioxide, carbon monoxide, and particulate matter are pollutants of greatest concern. Resources that can be affected by air pollution include visibility, flora, fauna, soils, surface waters, odor, and cultural/archaeological/historical structures and objects.

People often believe that when they visit non-urban national parks and Wilderness, they are leaving air pollution concerns behind. Nothing could be further from the truth. National Parks and Wilderness areas are affected by air pollution concerns such as ozone impacts, acid deposition, and visibility impairment. Not only can on-site pollution sources affect air quality, but pollution from upwind sources can be transported great distances and contribute to air pollution in Wilderness. Wilderness can experience pollutant levels as high as those in upwind urban areas. Power plants, incinerators, campfires, and vehicles are conspicuous sources of air pollution; less obvious sources are oil and gas drilling activities, gas stations, and landfills, among others.

Many types of legislation give public land management agencies the authority and responsibility to protect resources on their lands from air pollution. Some of the strongest legislation for air quality protection is found in the Wilderness Act and the Clean Air Act. There are six federal criteria air pollutants for which national ambient air quality standards have been established. The federal criteria air pollutants are carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide. The Clean Air Act designated all international parks, national parks over 6,000 acres in size, and national Wildernesses and memorial parks over 5,000 acres in size (in existence as of August 7, 1977) as Class I areas. These areas are afforded the greatest degree of air quality protection.

Background continued:

Although land managers can control air pollution sources within their areas, they are not able to regulate activities beyond their borders. Therefore land managers are working with state and federal regulatory agencies who grant or deny permits for new sources who may produce air pollution. It is the responsibility of land managers to impress on regulators the importance of resource protection, and provide regulators with information to give greater consideration to resource effects. Some examples follow. First, in a number of national parks and Wilderness areas, the National Park Service (NPS), U.S. Forest Service (USFS), and U. S. Fish and Wildlife Service (USFWS) have documented injury to native vegetation attributed to ozone. Second, the NPS relied on research and monitoring data to demonstrate that resources in Shenandoah National Park are being adversely affected by current levels of air pollution. The NPS was able to convince the State of Virginia that air pollution was adversely affecting plant life, visibility, and water quality in streams. Third, the USFS has determined that existing power plants in Northwestern Colorado are adversely affecting visibility and aquatic resources in the Mt. Zirkel Wilderness. As a result of these working partnerships, state regulating agencies, potential polluting businesses, and land managers are cooperatively funding research and monitoring. Types of information collected include monitoring ambient levels of gases and particles, and measuring deposition of acidic compounds to establish base lines and detect trends in pollutant levels. Examples of resource monitoring include measurements of surface water chemistry, visibility impairment, and injury to plant life. Using information gleaned from research and monitoring, researchers and land managers can make predictions about the consequences of future decreases or increases in pollutant levels.

Activity 1: Payne's World

Location: classroom

Materials:

- video: "Payne's World," more appropriate for grades 9-10
- video discussion questions, pages 409-410.
- student handout: "Air Pollution Issues Affecting Wilderness," pages 407-408.

Duration: 1 class period, possible homework

Procedure:

1. Provide background reading and discussion on air pollution and its effects on our public lands and on us.

Procedure continued:
2. Show the 15-minute video, "Payne's World." It is a fast-paced video parody of "Wayne's World". It is meant to be a fun introduction to the issues and presents possible solutions to air pollution impacts on natural resources. Content is applicable nationwide. Use discussion questions to help students connect how air pollution effects both humans and their landscape. Viewing the video and discussing the content will set the stage for the next activities but is not necessary to successfully complete the activities in this lesson.

Credit:
"A Teachers Guide For the Video, Payne's World on Air Pollution in the Sierra"

Activity 2: Air Strips

Location: classroom and school

Duration: 2 class periods, 1 week apart

Materials:
- 2" x 10" strips of poster board with short piece of string tied to one end
- clear tape 2" wide
- low power dissecting microscope or magnifying lenses

Procedure:
I. Setting the Stage for the Students

Our atmosphere is almost completely made up of invisible gaseous substances. Most major air pollutants are also invisible gaseous substances although large amounts of them concentrated in areas such as cities can be seen as smog. However, particulate matter is easily visible, especially when the surfaces of buildings and other structures have been exposed to it for long periods of time or when it is present in large amounts, such as smoke stacks from factories or industrial sites. Particulate matter is made up of tiny particles of solid matter and/or droplets of liquid. Natural particulate matter tends to be less of a problem to human health and the general well being of the environment than that which is human-caused. Natural sources include volcanic ash, pollen, and dust blown about by the wind. Coal and oil burned by power plants and industries and diesel fuel burned by many vehicles are the chief sources of human-caused particulate pollutants, but not all important sources are large-scale. The use of wood in fireplaces and wood-burning stoves also produces significant amounts of particulate matter in localized areas, although the total amounts are much smaller than those from vehicles, power plants, and industries.

Particulate air pollutants can be harmful to plant and animal life when the pollutants are absorbed. Discoloration of buildings and other structures is also caused by particulate pollutants; this is unsightly and expensive to clean up. Because it can have harmful and serious effects, particulate matter is one of the six criteria pollutants, a pollutant for which the government has established laws and air quality standards.

Procedure continued:

II. Activity

Part A: Construction of Air Strips

1. Ask students how we know air pollution exists. Are air pollutants visible? Invisible? Have students give examples of visible air pollutants (smoke, dust, smog, pollen). Define particulate matter for the students. Particulate matter (PM) is defined as a solid matter or liquid droplets suspended in the air. PM that is less than 10 micrometers in aerodynamic diameter (1/100th the width of human hair) is called PM10 (also called coarse particles). PM of less than 2.5 micrometers in aerodynamic diameter is called PM25 (also called fine particles or aerosols). PM10 is a criteria pollutant. Share with students the "Setting the Stage for the Students" information.

2. Provide materials to make the air strips and have students follow the directions on the sheet. Make an air strip for yourself. Use this strip to show the students how their finished products should look, then use it as a control for Part C for comparison with the test strips exposed to the air for one week. NOTE: Each students should make at least one air strip, more if there is time.

3. (OPTIONAL) Have students measure the mass (weight) of the air strips (including the control strip) as accurately as possible on a balance. If you choose to do this step, explain that the mass of the strips will be measured again after the week of exposure.

Part B: Location of Air Strips

1. Have students hang the strips at different places around the school, both inside and outside. Inside the school, hang strips in the halls, cafeteria, bathrooms, shop, gym, labs, and/or kitchen. Outside, hang strips in trees, along main walks, and at all entrances to the school. Give each student tape to secure the air strip's string to a stable surface at the selected sites. The air strips should be able to move freely without bumping other surfaces. NOTE: All air strips should be carefully labeled with date, location, and student's name.

2. After one week, have students collect the strips. Tell them to be careful not to touch the sticky side of the tape.

Part C: Analysis of Air Strips

1. Have students visually compare the control air strip to the air strips used to collect particulate matter.

2. (OPTIONAL) Have each student measure the mass of his/her strip and compare it to the mass of the air strip before the collection of particulate matter and to the mass of the control strip before and after the experiment (see note in A.3).

3. Distribute magnifying glasses and have the students try to identify as many particles on the tape as possible. Dust, ash, soot, and /or particles may be present. Depending upon the time of year, pollen may also have been collected (OPTIONAL: You may choose to have students use dissecting microscopes instead of or in addition to magnifying glasses).

4. Ask students to draw conclusions about the particulate air pollutants in the test area. Are there differences in the particles based on where the air strips were placed?

5. Have each student develop a chart or graph using the information gathered by the class and write a summary paragraph about the activity.

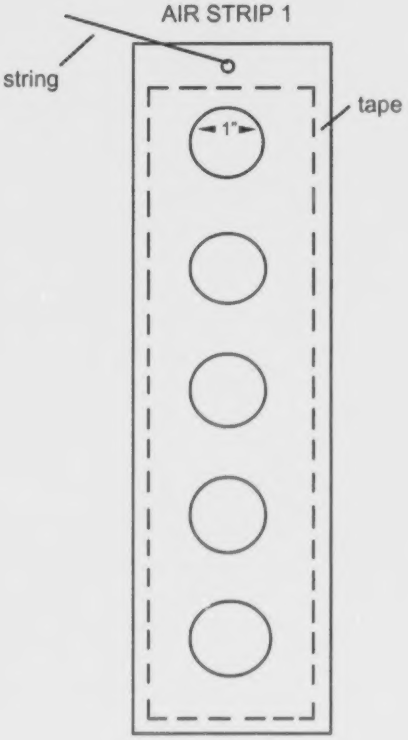
SCIENCE
Ecology; Earth Science; Geology

Extension:

1. Place air strips in a variety of other places for a week: homes, churches, stores, urban and rural areas, factories, car bumpers, high atop a roof, in a basement. Have students compare the particulates collected from the different locations.

2. Post new strips daily and compare them to determine if the day of the week makes a difference in the amount of particulate matter collected. Have students consider such possible factors as the weather, wind direction and force, and industrial or business schedules for the days examined (this can lead to discussion of particulate matter pollution sources). NOTE: If the students are examining daily influences, they need to keep daily records when they hand in the air strips.

Directions for Making Air Strip



1. Using a ruler to measure, cut strips of poster board that are 2' x 10".

2. Cut 5 holes, each about 1" (use a quarter as a guide).

3. Tie a string through a small hole at one end. Use this string to hang the strip in its location.

4. Place a piece of clear wrapping tape over one side of the strip so that all five holes are completely covered. **Do not touch** the sticky side of the tape which will collect particulate matter from the air.

5. Write on the top edge of the strip the date, location, and your name.

6. Now hang the strip by its string in your selected location where it cannot be bothered by other students.

Credit: "A Teachers Guide For the Video, Payne's World on Air Pollution in the Sierra"

Activity 1: Payne's World

STUDENT HANDOUT

Air Pollution Issues Affecting Wilderness

ACID DEPOSITION

What is it? Acid deposition, often called acid rain, is found as snow and rain, dry fall out, and fog and cloud water. Human-caused pollution has raised the acidity level of rain, snow, lakes, streams, and soils in many areas of the world. The acidity of water is measured on the hydrogen ion scale (pH), which ranges from 0 (most acidic) to 14 (most alkaline). Rain is naturally acidic due to carbon dioxide in the air, dissolving to form a weak acid with a pH of 5.2-5.6. Sulfuric and nitric acids are the primary acids contributing to acid rain, although organic acids also contribute. Sulfuric, nitric and organic acid form secondarily from SO2, NO2, and hydrocarbon emissions. Alkalinity, or acid neutralizing capacity (ANC), is a measure of how well surface waters neutralize acids, and is expressed in micro-equivalents per liter. Water with an ANC of less than 100 micro-equivalents per liter is considered sensitive to acidification. Wilderness lakes in the Sierra Range of California have a median ANC of 60 micro-equivalents per liter, and are undoubtedly among the most sensitive aquatic resources to acidic deposition effects in the country. Sierran lakes are primarily bicarbonate systems and alkalinity can be estimated using conductivity measurements.

What are the potential effects? Acid deposition can acidify waters and soils. Especially vulnerable are water and soils with low alkalinity which are most susceptible to acidification. Elevated acidity can injure aquatic life by decreasing immunity to infection and raising levels of soluble aluminum. The additional nitrogen in soils is thought to have a fertilizing effect which can result in winter damage and chemical imbalances in plants. The waters and soils of the Sierra, and Selway-Bitterroot Wilderness in Montana and Idaho, with their granite foundation and low alkalinity, are very sensitive to acid deposition. Both wet and dry deposition are significant in these areas. Highly acidic deposition has been measured during summer storms and spring snowmelt in the Sierra (episodic events). Experiments have shown that at these levels, aquatic microorganisms such as Baetis (mayfly larvae) and Daphnia (a zooplankton), are adversely impacted. While no long-term acid deposition effects have been found in the Sierra, there is considerable concern because the effects are subtle and difficult to study. Acid deposition can also contribute to deterioration of buildings. Effects of acid deposition on human health are being studied.

STRATOSPHERIC OZONE DEPLETION

What is it? The stratosphere (the layer of atmosphere above the troposphere) is where ozone is produced and destroyed naturally. The result is the absorption of harmful ultraviolet (UV) rays from the sun which would otherwise make Earth uninhabitable. The stratospheric ozone is being destroyed unnaturally by chemicals such as chlorofluorocarbons, halons, carbon tetrachloride, and methyl chloroform. They come from industrial and household refrigeration, cleaning solvents, air conditioning, insulation, fire extinguishers, and some plastic foam product manufacturing. These chemicals are very stable, nontoxic, and nonflammable. The use of these products is being reduced or banned worldwide, and substitutes are being developed.

Activity 1: Payne's World

STUDENT HANDOUT • **Air Pollution Issues Affecting Wilderness**

continued

STRATOSPHERIC OZONE DEPLETION

What are the potential effects? When depleting chemicals rise to the upper atmosphere, they destroy the protective ozone layer in the stratosphere. The depleting chemicals can take up to 10 years to reach the stratosphere, but once there, they can remain up to 100 years actively destroying ozone until they are rendered inactive or removed from the atmosphere. UV rays can cause skin cancer, increase incidence of cataracts, depress human immune systems, harm aquatic systems and plants, and accelerate weathering of outdoor materials. The "ozone hole" over the Antarctic is the most well-known and severe example of ozone depletion.

VISIBILITY IMPAIRMENT

What is it? Visibility impairment is caused by gases and fine particles (called aerosols) that can either absorb or scatter light (also called light extinction). Light can be scattered and absorbed in the observer's line of sight, and it can be scattered from outside into the observer's line of sight. The result is reduced clarity, color, texture, and form, or total obstruction of objects from view. Some light scattering and absorption is natural. The sky is blue because gases naturally present are in the size range that scatter blue light. Human activities create fine particles close to the size of the wavelength of light (1 micrometer). These fine particles are very efficient at reducing visibility. Coarse particles such as wind-blown dust have little effect on visibility. Visibility impairment can be in the form of general haze, layered haze, and plumes. Nitrates, sulfates, and organic particles are the primary cause of visibility impairment. In addition, NO2, in high enough concentrations absorb blue light producing a brown haze.

What are the potential effects? Visibility at scenic vistas throughout the nation is impaired by human-caused fine particles. Areas in the east and west experience the worst visibility impairment. When the atmosphere is relatively clean, such as in the Colorado Plateau, a small increase in air pollution is more easily noticed and more disturbing. In a clean atmosphere, visibility can be up to 250 miles.

Activity 1: Payne's World

STUDENT HANDOUT • **Discussion Questions**

Payne's World on Air Pollution in the Sierra

1. Give examples of air pollution affecting the environment around the world.

   Response: Dead trees in Black Forest of Germany, acidified lakes in Sweden, dissolved limestone ruins in Greece.

2. Air pollution takes several forms including ozone, acid rain, and particulate matter. Discuss each form and include examples of damage.

   Response: Nitrogen oxides and sulfur oxides from combustion and water combine to form acid precipitation weakening plants and destroying aquatic life; hydrocarbons and nitrogen oxides from natural sources, autos, and industry react with sunlight to form ozone which weakens plants and affects human health; dust, smoke, sulfates, and nitrates obscure visibility, and harm human and animal health.

3. Remembering the model of San Joaquin Valley, discuss what happens and why air pollution here can become such a serious problem. Discuss how air pollution affects Wildernesses down wind.

   Response: Pollution is carried by winds from the San Francisco Bay Area and are mixed with air pollutants from the San Joaquin Valley. Under certain weather conditions, the basin acts like a bathtub and the polluted air swirls around the valley. Eventually weather changes allow the air to disperse into the mountains, sending it to other parts of California, Nevada, Arizona and beyond.

4. How does air pollution affect health of people?

   Response: Young and old people, and those people with respiratory and cardiovascular problems are most susceptible to air pollution.

5. Suggest some things being done to decrease air pollution problems caused by automobiles and trucks.

   Response: Cleaner fuels are now required and we are using more alcohol and natural gas which produce much less pollution. People are encouraged to car pool, use mass transit, bicycle and walk. Other examples include electric cars and electric monorails.

6. Discuss some of the new and cleaner energy technologies scientists are working on today.

   Response: Solar power, electric automobiles, alternatives to fossil fuels such as alcohol and wind power.

Activity 1: Payne's World

STUDENT HANDOUT • **Discussion Questions**

Payne's World on Air Pollution in the Sierra

continued

7. The video shows six steps to problem solving. Discuss each step and try to solve air pollution problems in your area.

Response:

1) **Identify symptoms:** Yellow needles on dying pine, poor visibility, lower crop production.
2) **Survey:** Problem is worldwide, urban and rural, parks and forests.
3) **Define:** Polluted air can stress or damage living things, reduces quality of life, threatens survival.
4) **Scope:** Worldwide and no living thing is immune from the effects of pollution.
5) **Analyze:** Chemical emissions, such as hydrocarbons and nitrogen oxides from autos, trucks, tractors, industry, and natural sources react in the presence of sunlight to form ozone, and react with moisture to form acid rain. Particulate matter from agricultural activity, roads, and fossil fuel combustion, and smoke from burning waste and fireplaces obscure visibility and interfere with breathing.
6) **Solutions:** Use less energy (drive less, walk more), use cleaner energy sources (solar, wind power), recycle goods.

SCIENCE
Stewardship; Ecology; American Government

LESSON 8 • Connecting to Our Natural World

Objectives:
Students will:
- explore benefits of wildlands to people, animals, plants and soils.
- explore how wildlands are interrelated ecosystems where relationships occur.
- describe values of wildlands and list how these values benefit wildlife, plants, soils, communities, and themselves.
- build an ecosystem composed of federal, state, and private land designations and describe some of their differences and how they connect and relate to one another.
- see how people impact the earth and must develop responsibility and stewardship to preserve our wildlands.

Duration: 6 to 10 class periods

Location: large playing field or natural area, or could be done indoors

Background:
To encourage people to behave responsibly on the land, we must educate them about **land ethics**. People will only practice taking care of the land when they realize the important connections relating to themselves, their communities, animals, plants, and all the components in an ecosystem.

We need to nurture a love for the Earth, a joy of being in touch with wild things and a kinship with the natural world. This can be embraced whenever we live and play in our communities and in our wild places. When people understand the importance and benefits of our natural world, they will then nurture their personal relationship and passion for wildlands. We should provide insight into personal values and ethics and our connections to these special places and the importance of preserving and conserving our resources for future generations.

Students are going to build an ecosystem. They will explore how our cities, communities and individuals connect, interact and influence our wildlands. They will also see how wildlands, plants and animals interact with each other. The relationships and connections we have with these lands and urban areas will be emphasized.

SCIENCE
Stewardship; Ecology; American Government

VOCABULARY

Ecology - A science that studies how living things interact with one another and their environment. It is derived from the Greek word "oikos" meaning "house" or "place to live". Ecology is concerned with the interdependence of and the interrelationships among plants, animals, people, and the environment. Nonliving elements are soil, air, and water.

Laws of Ecology -

- Everything is connected to everything else.
- Everything has to go somewhere.
- Everything is always changing.
- There is no such thing as a free lunch. (Humans entered the web of life and have impacts on the land and ecosystems). Human gains and advancements stress the environment.

Ecosystem - An ecosystem includes living organisms interacting with each other and with the nonliving environment to exchange energy, water, oxygen, carbon dioxide and minerals. They vary in size from a tiny pond to the Atlantic Ocean.

Biosphere - The Earth's ecosystems are biomes. The biosphere is the thin fragile life that extends from a few feet below the soil surface to several miles above it. It is the only place on earth known to support life.

Activity 1: Wildland Designation

Materials:

- land designation cards, pages 418-420.
- wildland Value/Benefit cards, pages 422-424.
- large open space, preferably a natural setting, 50 feet by 50 feet.
- natural objects such as rocks, sand, cones, trees and vegetation to build with
- paper to draw animals, buildings, birds, etc.
- crayons or markers
- water
- plastic containers to hold lake and a river
- 10 pieces of yard, different lengths, 1 - 10 feet
- plastic people figures

Procedure:

To the Teacher:

1. **READ THIS ENTIRE LESSON PLAN AND BACKGROUND INFORMATION BEFORE YOU BEGIN.** You and your students can then prepare materials before beginning the lesson.
2. Prepare an open area before the students arrive that has enough space for the group to build an ecosystem that has various land designations, cities, and communities.
3. Make one copy of the student handout "Wildland Inventory" for each group, page 425.

For the Students:

1. Ask class to make small cutouts or bring natural objects to use as building materials, such as rocks, sticks, grass, and other similar items. Students can either make cutouts or bring items from home that are found in their state parks and wildlands. Have students make cutouts of animals, plants, and buildings. You can substitute Legos or Lincoln logs to build with. Gather plastic animals and people as props for the activity.
2. Ask students to cut out cards for the activity: A set of land designation description cards, pages 418-420, and a set of wildland value/benefit cards, pages 422-424.
3. Move your students to a flat open space, 50 feet by 50 feet, that has room for students to spread out. Divide the group into pairs.
4. Give each group one land designation card. Designate a place for each pair to go with their land designation. An example map is included in this lesson to demonstrate the concept, page 417. Give each group a piece of yarn to outline the boundaries of their land designation.
5. Ask each group to read the description of their area, put in their boundary and then use natural objects to show what the area looks like. Encourage creativity in designing the land designation. Some areas may have roads, trails, a visitor center and others may not. Students can use plastic pieces or cutouts to show special features, wildlife, birds, plants and people. Give them 10-15 minutes to work.
6. Ask each group to present their land designation to their classmates. Each land designation should have two plastic people. Each group will describe their area, read the description, and decide who is in charge of taking care of the land. They should address special features, roads, trails, natural features and buildings. Ask students to demonstrate how these two people visit this area and what their method of travel will be. Ask the following questions of the group:
   - Can you camp here? What is the least impacting way to visit the area?
   - What kind of opportunities are there for people to recreate? For wildlife to live? For plants to grow?
   - How is the air and water quality?
   - Is the soil used for farming or agriculture? Is there any grazing of cows or sheep?
   - Is there mining here?

SCIENCE
Stewardship; Ecology; American Government

Activity 2: Values and Benefits of Wildlands

Materials:

- Wildlands Value/Benefit cards, pages 422-424.
- student handout: "Wildlands Inventory", page 425.

Procedure:

1. Give each group a Wildlands Value/Benefit card. Distribute one Wildlands Inventory student Handout to each group. On the back of the card are examples that pertain to or are associated with the Value/Benefit on the front. Ask each group to write these examples on their Wildlands Student Handout in the column next to the Value/Benefit listed in the left column. Remind them to include examples pertaining to their wildland designation from Activity 1. Also encourage them to include any other ideas they can brainstorm on their own.

2. Ask groups to brainstorm how their Value/Benefit card has an influence on animals, plants, soil, communities and for each individual in the group. This could be a positive or negative connection for each of these items listed on the column under connections. Ask each individual student to focus on their senses and feelings (touch, taste, hearing, vision, smell, or feelings from within). Have them think about these senses in relation to the their land designation. Then ask each pair to fill in the boxes for their land designation card. For example, if they were given the Value/Benefit card of Natural Processes they would list examples from their card, then list how this Value/Benefit card relates to animals, plants, soil, communities, to themselves.

3. Have each group present the Value/Benefit card pertaining to wildlands and how it relates to the land designation they have created. They should describe the connections they found for each category on their handouts. As students listen to other groups present have them fill in their handouts.

4. Conduct a summary discussion with your students. Encourage students to think about the benefits/values of wildlands and how they connect and benefit people, plants, animals, and soil.

- Are all values to humans also values to animals?
- Are there other values to animals and plants that are benefits to us?
- Discuss how the ecosystem is composed of subland designations and ecosystems.
- Where are some benefits more prominent in the ecosystem than others?
- For example, where is the water and clean air? Where would you find wildlife?

Activity 3: Making the Connection

Materials:
- beaker or clear glass
- food coloring
- soap
- scraps of paper (representing litter)
- pine cones
- 2 erasers with chalk

Procedure:
This part of the lesson focuses on relationships within the ecosystem, how our actions influence our wildlands, and how processes within wildlands influence us. This activity is dependent upon completion of activity 1, Wildland Designation.

1. Ask the group to look at their ecosystem and answer the following questions about **water**. Ask each group to explain the paths of water in their land designation. Where does the city gets its **water**? Where do ranchers get their water? How many wildlands provide water to the city? What is a watershed? Rivers, Wilderness, and natural areas have water in them. Where does this water come from? Ask each group to describe what happens when these sources become polluted. Does it affect the city? Wildlife? Plants? What if soap from someone's dishes is added to the lake? What happens if fecal matter is deposited in a Wilderness stream? What can we do to make sure these things don't happen?

2. **Water** Demonstrate the process by using a glass with clear water. Add dark food coloring, some soap, litter and a pine cone representing fecal matter. If you're outside then demonstrate how this effects the whole ecosystem. Ask groups with land designations of National Recreation Area, Wilderness, Wild River to pour dirty water into their land designations. Watch where it flows. How does this make them feel about their land designation becoming polluted. How about the city? What does this affect?

3. **Acid Rain** Ask students to define **acid rain** and demonstrate the effects of acid rain on land designations. In our cities fuels from power plants and cars produce sulfur dioxide and nitrogen dioxides. These gases combine with water in the atmosphere and form acids. These acids can fall to Earth. Pollution from urban centers may be transported to high mountainous areas. Have one of the city students be a gas that rises out of the city and the other partner be the wind. As these gases move, they combine with water over the mountains and fall. Have city students sprinkle water on the other wildlands they think may be affected. Which area are impacted? Are higher elevations more or less affected? Why? Does this affect plants, water, soil, animals?

4. **Wilderness Fire** Fire is a natural process that sometimes when caused naturally, is allowed to burn. The health of many ecosystems is related to periodic fires. Fire burns out excess fuels and creates habitat. If a fire burns in Wilderness how does this affect other areas? Ask a Wilderness person to enact a lightning strike and show how fire spreads. The other Wilderness person has two erasers with chalk on them. Clap them together to become the smoke from the fire. Where does the smoke go? What happens if there is wind from the north? What happens to the community next to the Wilderness? Should this fire be put out? What if it remains within the boundaries of the Wilderness? What are the benefits of fire to plants, animals and people? Should people build homes next to Wildernesses? Why? Why not? What happens if there is a fire in the city? In a recreation area? What happens if there is a fire naturally started in a national park? What about a fire that is started by a campfire? Will it be put out in the Wilderness?

5. **Air Pollution** Air pollution is transported via air currents from cities to wildlands. This affects visibility and enjoyment of many people. Have the city students use the chalk erasers clapped together. One student can be the wind. Does the air pollution affect other wild places? Does it affect plants? Wildlife? How is the air quality in the national parks, recreation area, Wilderness? Each group should answer for their land designation. Have students take a deep breath. Ask why is clean air so important? What does air in wildlands smell like? After the chalk erasers are clapped how does the air look, taste, and smell? Do boundaries affect air pollution? Where does air pollution come from? What can you do to help reduce air pollution?

6. **Wildlife** A mountain lion leaves a national recreation area and travels into the edge of the city. What happens to the lion? How do people feel? Why is the lion leaving the national recreation area? How does the lion react when people visit the lion's habitat?

7. **People** A national park has 5000 visitors per day. There are 500 vehicles causing too much traffic. What can they do? Can they limit the number of visitors? Are there permits to enter the park? In the backcountry? How does our population affect our wildlands?

8. These are just a few connections for students to look at within an ecosystem in their different land designations. You can use other issues that are appropriate for the student groups. Other ideas are a rancher welling land for a subdivision, a volcano explodes, floods, a mine next to a Wilderness, or lumber mill closes due to a slow timber market.

Evaluation / Follow-up / Extension

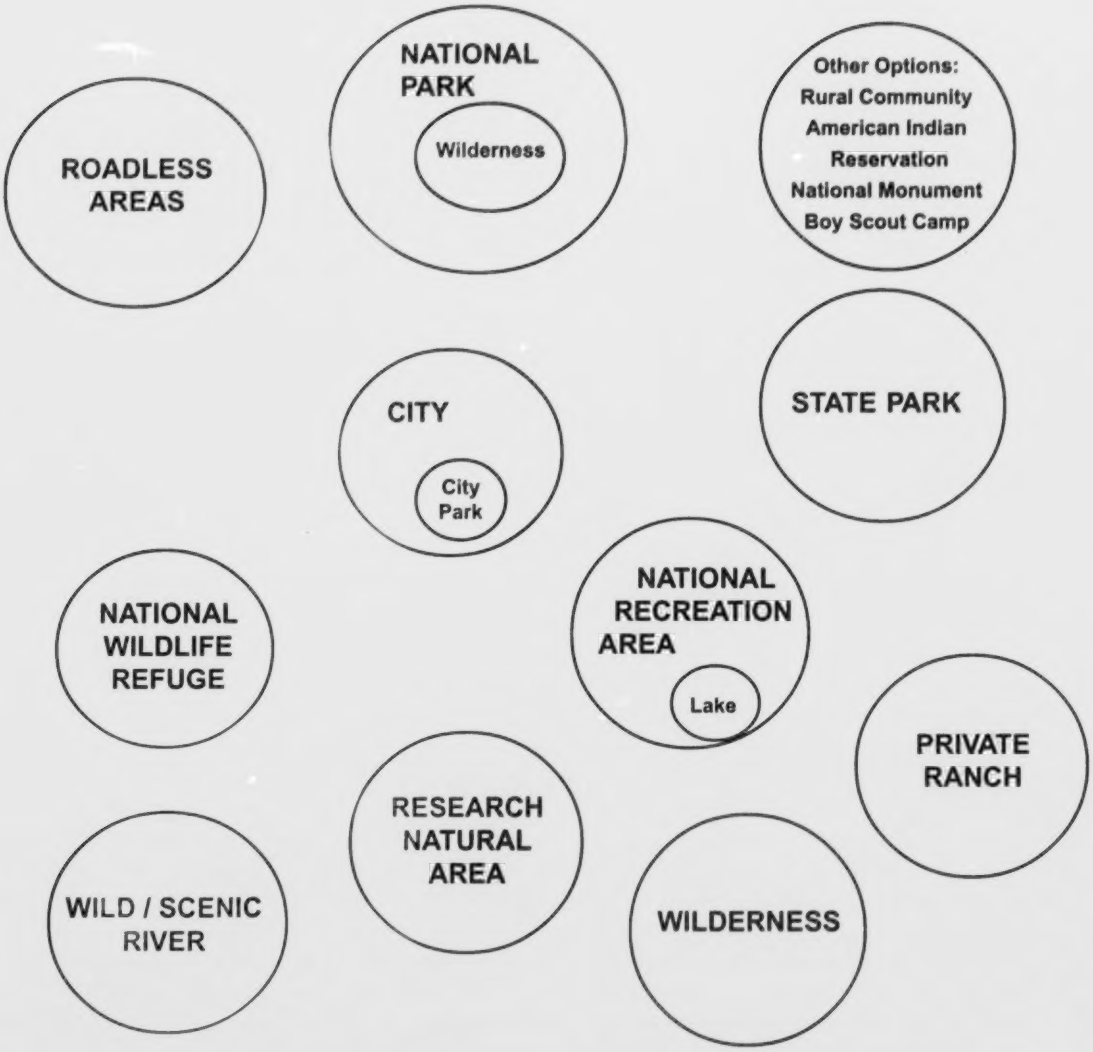
Summary discussion: Ask groups to name the components of their ecosystem, the different land designations, and who manages these lands. Ask groups to name some of the values or benefits of wildlands to people, animals, and plants. Why is it important for us to take care of wildlands? What are some ways we can take care of wild places in our cities? When you visit wildlands, what can you do to take care of these places? Who is responsible for taking care of these wild places? Why are these places important to you? Are there any places we should not take care of?

Career Options:

land planner, natural resource professional, environmental advocate, rancher, miner, logger

Activity 1: Wildland Designation

Ecosystem Map (example)



This is just an example and can be arranged very differently. Also, each of the areas may represent smaller ecosystems within a larger ecosystem.

Activity 1: Wildland Designation

LAND DESIGNATION CARDS

National Forest Roadless Area - managed by U.S. Forest Service
This land is wild, undeveloped land without any roads that offer recreational opportunities. Many provide opportunities for trail bikes, All Terrain Vehicles (ATV's—motorized recreation), mountain bikes, hiking and camping opportunities

---

National Park - managed by the National Park Service
This land is set aside for the use and enjoyment of the people and to preserve the land in its natural condition for future generations. National Parks were established to protect natural historical or cultural resources. Many provide recreational opportunities. Many have roads, visitor centers, picnic sites, campgrounds, backpacking and horse trails, lodges, and motor boats. Some parks have Wilderness areas within them.

National Wildlife Refuge - managed by U.S. Fish and Wildlife Service
This area is established to conserve the nations' birds, fish, and wildlife and their habitats. These areas often have visitor centers, interpretive trails and wildlife viewing areas. Some refuges also have designated Wildernesses.

State Park - managed by the state.
They provide recreational opportunities, trails, campgrounds, picnic grounds and marinas.

Wild and Scenic Rivers - managed by U.S. Forest Service, National Park Service, U.S. Fish and Wildlife Service, and Bureau of Land Management
These rivers have three different classifications: wild, scenic, and recreational depending on the amount of development. In 1968 Congress established a system of rivers to be preserved in free-flowing condition with protection of the environment. These rivers allow boating opportunities for people such as rafting, kayaking, canoeing and motor boating. Many wild rivers are in Wilderness and do not allow motorcraft.

Activity 1: Wildland Designation

LAND DESIGNATION CARDS

National Recreation Area - managed by the U. S. Forest Service and National Park Service

These areas are set aside for recreation. Backpacking, horse back riding, climbing, hiking, and mountain biking are often allowed. Snowmobiles and other motorized equipment are allowed. For this activity, the area has a lake and allows motorboats.

Research Natural Area - managed by the U. S. Forest Service

Recreation is not a primary use. They are natural ecosystems providing opportunities for scientific and educational study.

Private Ranch - managed by private individuals or groups

Cows and sheep are grazed here. In the summer this ranch has students come for one week to work on the ranch and learn ranching techniques. This rancher may sell part of their property for a housing subdivision.

Wilderness - managed by the four federal agencies

Wilderness is a place where natural processes are the primary influence and human activity is limited to primitive recreation like hiking, horse and llama packing, and non-motorized boating. These lands are protected and valued for their ecological, historical, scientific and experiential resources. Timber cutting, road building, and mechanized vehicles are restricted. Mining and grazing are allowed in some places if these activities occurred before the land became Wilderness. Helicopters and other motorized/mechanized equipment are not allowed except for certain circumstances like a medical emergency. Some Wildernesses are very remote and large while some are small in size and located near urban areas.

Activity 1: Wildland Designation

LAND DESIGNATION CARDS

City - managed by city municipalities

This city has two large industries. There is a population of 300,000 people. There are skyscrapers, buses, stadiums, museums, etc. In the middle of a city is a central park. This park has running trails, a roller coaster, picnic tables and benches, skateboard ramps, a carousel, and mountain bike trails.

Activity 1-2: Wildland Designation: Values and Benefits of Wildlands

WILDLAND VALUE / BENEFIT CARDS

Wildlife / Birds / Reptiles	Spiritual / Solitude
Natural Processes	Recreation
Clean Air / Water / Soil	Education
Challenge / Physical	Habitat / Ecosystems
Cultural / Historical	Science / Research

Activity 1-2: Wildland Designation: Values and Benefits of Wildlands

WILDLAND VALUE / BENEFIT CARDS

independence self-sufficient self-esteem confidence refuge from noise, speed of machines, crowds	(animals in your vicinity) deer elk moose rabbits ravens mockingbirds alligators ducks snakes lizards
hiking horsepacking skiing mountain biking climbing hunting fishing boating	avalanche erosion volcano flood earthquakes
compass navigation, maps leave no trace geology classroom for nature birds and animals group dynamics	streams clean air mountain lakes plants, trees animals watersheds sand, organic soils, humus
open space "web of life" biodiversity rare/endangered plants species live freely preservation / conservation animal diversity habitat gene pools refuge	mental health physically fit risk challenge group dynamics / interaction
baseline data research natural interactions compare with cities living laboratory geologic resources	American Indians freedom, ingenuity, independence history-- human relationships with the land dwellings, homes human relationships primitive skills / tools spiritual

Activity 1-2: Wildland Designation: Values and Benefits of Wildlands

WILDLAND VALUE / BENEFIT CARDS

Food	Products for humans
Beauty	Economic / Tourism

Activity 1-2: Wildland Designation: Values and Benefits of Wildlands

WILDLAND VALUE / BENEFIT CARDS

wood---homes rock minerals----jewelry, pipe rubber furniture plants medicine	plants and animals in your vicinity : berries elk cactus moose roots goose mint antelope rabbit
business outfitting tourism mines art photography	inspiration of art music writing connections with beauty creativity peacefulness

Activity 2: Wildland Designation

STUDENT HANDOUT • **Wildlands Inventory**

WILDLANDS

		Connections / Benefits / Non-benefits				
Benefits / Values	**Examples From Cards (include other ideas)**	**Animals**	**Plants**	**Soil**	**Communities**	**Self Senses** Touch, Taste, Hear, Smell, Feel
Wildlife / birds						
Clean Air / Water						
Challenge/ Physical						
Cultural/ Historical						
Spiritual/ Solitude						
Recreational						
Education / Outdoor classroom						
Habitat/ Ecosystems						
Science/ Research						
Food						
Products						
Beauty/ Scenic/ Patterns						
Economic/ Tourism						

MATH

MATH
Geography

LESSON 1 • Wilderness Happenings— What the Numbers Tell Us

Objectives:
Students will:

- predict possible trends in wilderness acquisitions and wilderness use and illustrate these trends with various types of graphs.
- chart the total acreage and percentage of federal lands that each of four federal agencies manage as wilderness.
- visually represent how much land is currently set aside as designated Wilderness.

Duration:
1 or 2 class periods depending on the number of activities chosen and the extent to which they are developed.

Location: classroom • library

Background:
Howard Zahniser, the Executive Director of the Wilderness Society who first conceived the idea of a National Wilderness Preservation System, imagined a network that would consist of about 60 million acres. The Act, passed by Congress in 1964, established only 9.1 million acres. While it is true that since 1964 this figure has grown tenfold to about 104 million acres, nearly two-thirds of these lands are in Alaska and almost all of the rest are west of the 100th meridian.

This means that only 1.8 percent of the contiguous United States of America is preserved within the Wilderness System, over 95% of it is in the 11 Western states or Alaska. Not even 5% of the nation's Wilderness lies east of the 100th meridian, and almost half of it can be found in just two areas, Everglades National Park in Florida and the Boundary Waters Canoe Area Wilderness in Minnesota. The 11 states from Maine to Maryland, where nearly 1/4 of the nations's entire population resides, includes only 2/10th of 1% of the National Wilderness Preservation System.

As more lands are recommended for Wilderness designation, many considerations must be taken into account. There are those who fear too much land will be "locked up" as federal public property. There are those who worry that we do not yet have an adequate system in place to manage millions of acres for public use and preservation. And there are many who would like to see more lands set aside as protected ecosystems within the Wilderness system.
The purpose of the following activities is to promote an understanding of the scope of the Wilderness system and provide insight into the trends and challenges that face the land agencies that manage our wild lands.

Activity 1: Where is Wilderness?

Materials:

- NWPS Fact Sheet, make copies from "Wilderness: An Overview" section of curriculum, page 13.
- NWPS Map (both sides).
- Student Handout: NWPS State by State, pages 20-45.
- Student Handout: "Wilderness Happenings - What the Numbers Tell Us", page 432.
- graph paper • notebook paper • colored pencils, optional

Procedure:

1. Distribute the handout to each team of 2 to 4 students.

2. Share the background information to the extent that the students understand that they are to determine where most Wilderness areas are concentrated and what states should have lands possibly considered for Wilderness designation.

3. Instructions:
    - Use the Student Handout: NWPS State by State, pages 20-45.
    - Using the state column, determine which states have the most designated Wilderness areas.
    - List these states in order, from those with the most areas to those with the least. Make a separate list of those states with no Wilderness areas.
    - Make a bar graph of the 15 states at the top of the list, those having the most wilderness areas. The Y axis should be the number of areas and the X axis should be the name of the state.

Follow-Up:

- After the students have finished their graphs, have them answer the following questions: (these are printed on a later page that can be photocopied if needed)

  A. In what regions of the United States are most Wilderness areas to be found?

  B. What states, if any, do not have any designated Wilderness? Propose a reason for this lack of Wilderness.

  C. What events may have caused those states with very little Wilderness to not designate more wild lands?

  D. What types of habitat do most Wilderness areas contain?

  E. Choose one state with very little Wilderness. Can you suggest an area of wild land that could be established or restored in this state? What would need to occur for your suggestion to become reality? Hint: What was the area like before European immigrants arrived?

  F. Where do you think more Wilderness lands might have the best chance to be introduced? Why?

Extension:

- Have students research how many different types of ecosystems are protected as Wilderness. Are all altitudes, moisture types, biomes, etc. preserved some where in the US? What types of areas need to be added to the system to ensure their biodiversity is not lost?

Activity 2: Growth of National Wilderness Preservation System (NWPS)

Materials:

- handout: "National Wilderness Preservation System."
- colored pencils.

Procedure:

1. Pass out the handout.

2. Share the background information from page 427 of this section: specifically the number of acres in the first designated area and the current number of acres nationally. Explain that there are often cycles in public opinion and cycles in popularity of environmental concerns. Tell the students that the next exercise will allow them to infer when the next round of growth may occur in designating lands in the National Wilderness System.

3. Instruct the students that their first graph will be based on the year column.

4. Have the students graph the number of areas added to your state or regional Wilderness in each given year. One axis will be the years 1964 through 1993. The other will be the number of areas added to the system. Suggest that they do some preliminary penciling to determine which axis should be which. It is suggested that the X axis be the year of acquisition.

5. Once the points have been plotted, suggest that a bar graph may paint a better picture.

6. Have the students construct a second graph. This time the graph will be based on the acres column and the year column. They will be graphing the total number of acres designated each year from 1963 to 1996.

For this exercise the students will have to total the number of acres before starting their graph in order to determine the best layout. It is suggested that the X axis be the year of acquisition.

Follow-Up:

After the graphs have been completed, have students answer the following questions: (from the student handout, page 433.)

A. What years showed the greatest increases in lands added to the Wilderness system in terms of numbers of areas added?

B. What years showed the greatest increases in lands added to the Wilderness system in terms of acres added?

C. How many years passed between the years with large additions to the system? Do you see a trend? If so, when would you predict the next major additions to occur? Why?

Follow-up continued:

D. List five factors that may determine whether or not new lands will be added to the Wilderness system.

E. Looking at your handout, which agency currently manages most of the Wilderness lands in your state or region?

F. Do you think a separate agency should be created to manage Wilderness only? If more areas are added? Why or Why not?

Supplemental
Activity : Alaska

Materials:

- National Wilderness Preservation system (NWPS) map.
- student handout: "NWPS," in "Wilderness: An Overview" section, page 15.
- graph paper
- paper for calculations
- colored pencils

Procedure:

1. Show a map of the NWPS. Ask students to note where the greatest density of Wilderness areas are located. Discuss the types of habitat these areas encompass, the density of human habitation and the degree of accessibility.

2. Hand out copies of the "NWPS Student Handout."

3. Ask students to construct a triple bar graph which will illustrate the information given on numbers of federal acres each agency manages.

    A. X axis — the agencies with enough space to draw three bars for each

    B. Y axis — the number of acres to the nearest million (from 1 to 96)

    C. First bar for each agency — number of acres excluding Alaska

    D. Second bar for each agency — number of acres Alaska alone

    E. Third bar for each agency — total federal acres

Follow-Up:

When the graphs are complete, instruct students to use their graphs and the handout to answer the following questions.

A. Which agency manages the most total acreage? Which agency manages the most

Follow-Up continued:

acreage in Alaska? Of the United States Department of Agriculture (USDA) and the United States Department of the Interior (USDI), which department manages the most acreage?

B. Alaska contains what percentage of the total number of designated Wilderness acres?

C. What characteristics made Alaskan lands suitable for Wilderness designation?

D. How do you feel about taking lands where people have settled and restoring them to a wild state, as close as possible to the condition they were in prior to European immigration? For example—a tall grass prairie in the central states.

Extension:

- Have students read the mission statements of each of the land management agencies (see "Wilderness: An Overview" section) and determine how these statements may guide their practices. See page 15.
- Have students research the total Wilderness acreage in their state or region. Calculate what percentage of the state is designated as Wilderness.

Evaluation:

- Evaluate students graphing ability, answers to the discussion questions, participation in developing visual examples of environmental impacts, etc. Graph evaluation should include: neatness, clarity, labeling and accuracy.

Career Options:

mathematician, statistician, environmental impact researcher, computer scientist—modeling global changes, computer programmer, report writer and/or photographer, cartographer, Wilderness manager, resource manager.

References:

- *Wilderness Awareness Training Module*, Arthur Carhart National Wilderness Training Center
- Wilderness Land Ethic Curriculum K - 8, Background Training Material
- Washburne, R. F., and D. N. Cole, "Problems and Practices in Wilderness Management: A Survey of Managers." Research paper, INT304, February, 1983, Appendix B.

MATH
Ecology; Biology

LESSON 2 • Carrying Capacity:

What is a Viable Population?—A Lesson on Numbers and Space

Objectives:
Students will:

- list at least 3 components which determine the carrying capacity of an area for a certain species.
- mathematically determine minimum range sizes for maintaining a theoretical minimum viable population for three to six animal species.

Duration:
One class period for "Do You Have Enough Space for Those Animals?—Carrying capacity as a population limiting factor."

Location: classroom

Background:
The number of animals that can live in an area is determined by that area's carrying capacity. Carrying capacity may be seen as a type of dynamic equilibrium. It is typically expressed as the number of animals of a given type which can be supported by a given area. Carrying capacity is usually limited by some aspect of a species' habitat requirements. These requirements include the quantity and quality of available food, water, shelter, space and the suitability of their arrangement. Natural and human causes both affect carrying capacity. Effects may be short or long term. Activity 1 focuses on inbreeding depression and why small populations generally are not viable ones. Activity 2 focuses on carrying capacity and the needs for large tracts of natural space for populations of animals to survive.

MATH
Ecology; Biology

Activity 1: Do You Have Enough Space for Those Animals?

Materials:

- maps of Wilderness areas or National Park areas. These can be local maps (within the state) or maps provided in the wilderness box. Maps should include topography.
- paper and pencil.
- student handouts—population and area chart, discussion questions, pages 439-440.

Procedure:

Have students:

1. Make copies of the student handout, page 439-440. Study the range requirements for each species.

2. Calculate the minimum area required for each species. If time is limited, have them pick 3 of the listed species to work with. To do this, multiply each range value (the low value and the high value) for area needed by one individual by 50 to get the needed range for a population of 50 (25 breeding pairs).

3. Find three areas of open space on their maps which have enough acreage to support each of the species. Consider using the low end ranges first, then try to find areas that have enough space for the high end ranges. To do this, students may have to use the distance scale on the map and a conversion factor.

> 1 square mile = 640 acres
>
> Hint: if an area is one mile long and 1 mile wide, it contains 640 acres or
>
> 1 x 1 x 640 = 640 acres
>
> if an area is 1/2 mile long and 1/2 mile wide, it contains 1/2 x 1/2 x 640 =
>
> 1/4 x 640 = 640/4 = 160 acres
>
> if an area is 1/2 mile long and 1/4 mile wide, it contains 1/2 x 1/4 x 640=
>
> ___ acres

Students will then fill in the chart and answer the questions.

Follow-up:

- Discuss the student answers in class. Have them compare their calculations with other students to determine their accuracy.
- As you reach the "numbers" section of each reading, have a student write the animal's name, the minimum viable population number, and the number of acres needed on the board. If it is easier, have a student read the passages and you write the numbers on the board.

Follow-up continued:

- After reading the passage(s), ask the students if they think they have enough animals for viable populations and if they have enough space in their chosen areas for a viable population.
- Have the students read or listen to either or both of these passages: "Wild Hunters, Predators in Peril" (the paragraphs concern Canada's population conservation goals) or "Reserve Size and Populations Viability" from The Wildlands Project.

Reading: Wild Hunters—Predators in Peril

The basic principle behind calculating a minimum viable population (MVP) of a wildlife species is to determine a conservation "bottom line." If we allow numbers to sink below that bottom line, we run the unacceptable risk of the species or population declining toward extinction. Calculating MVPs is a complicated and still-evolving field of population ecology. Such calculations, though they are the best guesses anyone can make for now, are fraught with uncertainty and assumptions that have been made in the absence of definitive scientific evidence. Nevertheless, the work of various researchers has helped the World Wildlife Fund make best guesses at MVPs for those large carnivores for which some information is known. Our MVP estimates are only for short-term population viability of top predators, in other words, for a 50 to 100 year time frame. Current genetic research suggests that, for long-term population viability, say for 1,000 years, ten times the number of animals and therefore ten times the amount of protected habitat, would be needed.

Although these calculations are imprecise, they are the best possible to date, and they result in some pretty startling figures. For example, MVP calculations are 393 for grizzly bears, 148 for wolves, 78 for cougars, and 313 for wolverines. Using known information on the home-range or habitat requirements for these species, such MVPs translate into very large space requirements. Examples are in the order of 19,650 to 78,600 square kilometers (7,600 to 30,400 sq. miles) for a minimum viable population of grizzly bears, and between 26,650 and 59,990 square kilometers (10,300 and 22,000 sq. miles) for wolverines. The areas required for minimum viable populations of wolves and cougars are difficult to calculate because of the great variation in wolf and cougar densities occurring in different regions of Canada.

Career Options: geneticist, wildlife biologist, range scientist

References:

- Anderson, A.L., D. C. Bowden, D. M. Kattner. 1992. *The Puma on the Uncompahgre Plateau*, Colorado. Colorado Division of Wildlife Technical Publication No. 40 CDOW, Fort Collins, Colorado.
- Benedict, A. D. 1991. *A Sierra Club Naturalist's Guide - The Southern Rockies.* Sierra Club Books, San Francisco, California.

References continued:

- Hummel, M., S. Pettigrew, J. Murray 1992. *Wild Hunters Predators In Peril.* Roberts Rinehart Publishers, Niwot, Colorado.
- Noss, R. F. "The Wildlands Project - Land Conservation Strategy." *Wild Earth Special Issue.* 1992. Cenozoic Society, Inc. Canton, New York. p. 19.
- Project Wild, Secondary Activity Guide 1986. "Carrying Capacity" Western Regional Environmental Education Council, Project Wild, Salina Star Route, Boulder, Colorado. p. 221.
- Schmidt, K. J. 1990. *Conserving Greater Yellowstone A Teacher's Guide Northern Rockies,* Conservation Cooperative, Jackson, Wyoming.

STUDENT HANDOUT

Activity 1: "Do You Have Enough Space for Those Animals?"

(copy front to back for one sheet, pages 420-421)

Information chart with range requirements for a number of species of mammals:

grizzly bear—From 30-1100 sq. miles depending on vegetation. They require substantial vegetation.

wolverine—From 300-400 sq. miles, in general. Wolverines need all sizes of mammals to prey on and enough other large predators (wolves, lions, etc.) to kill large animals and leave carcasses which make up the wolverine's primary food source.

bobcat—1 - 65 sq. miles depending on availability of prey adaptable to - all terrain.

mountain lion– 40 - 360 sq. mi. (Colorado) depending on prey base (male ranges are larger that female ranges).

lynx—6 -19 sq. miles dense forest, northern areas - mature coniferous forests, need a population of small mammals to prey on.

wolf—20 to 600 sq. miles - need year round supply of large ungulates (deer, elk, moose, bison) and denning cover.

Procedure:

1. Study the range requirements for each species.
2. Calculate the minimum area required for each species. To do this, multiply each range value (the low value and the high value) of the area needed by one individual by 50 to get the needed range for a population of 50 (25 breeding pairs). Keep your calculations.
3. Find an area of open space on the maps for each species which has enough acreage to support 50 individuals of that species. Consider using the low end ranges first, then try to find areas that have enough space for the high end ranges. To do this, use the distance scale on the map and a conversion factor.

1 square mile = 640 acres

Hint: if an area is one mile long and 1 mile wide, it contains 640 acres. This can be written in an equation to help you figure other areas: 1 x 1 x 640 = 640. If an area is 1/2 mile long and 1/2 mile wide, it contains 1/2 x 1/ 2 x 640 = 1/4 x 640 = 640/4 = 160 acres. If an area is 1/2 mile long and 1/4 mile wide, it contains 1/2 x 1/4 x 640= 1/8 x 640 = 640/8 = ____acres

STUDENT HANDOUT

Activity 1: Do You Have Enough Space For Those Animals?

Fill in the chart and answer the questions:

Range Needs for 50 Individuals & Areas Where Each Species May be Found

	acreage needed for 25 pairs (50 animals)	area chosen
Grizzly bear		
Wolverine		
Bobcat		
Mountain lion		
Lynx		
Wolf		

After finding areas which are large enough in terms of acreage, study the terrain of the area you have chosen. Answer the following questions (on a separate piece of paper) .

1. Is there enough suitable habitat for each species? Is there enough shelter, food, and water, or does the area need to be enlarged?

3. What will happen to your animal populations if there is a drought or fire? Can they move to an area of more water, or more food?

4. Can you enlarge the area without encroaching into human inhabited areas?

5. Are the areas you chose comprised of protected designated Wilderness or do they include national forest, state forest, national park, national wildlife refuges, or BLM land? What are the chances your reserves may be developed?

6. If you cannot enlarge the area, how many pairs of animals can the area support?

Lesson 3 • Energy Consumption and Wilderness

Objectives:
Students will:

- describe impacts on wildlife and Wilderness derived from various kinds of energy development and use
- evaluate the impact on wildlife and Wilderness as a result of their own energy-use practices
- learn about alternatives to fossil fuels and renewable forms of energy
- develop an action plan on energy issues

Background:
The United States has 5% of the world population yet uses 30% of the energy consumed by the human population. Many other industrialized countries enjoy a standard of living similar to our own, yet use less energy per capita than we do. From these figures it becomes obvious that we could conserve far more energy and still maintain a comfortable life and healthy economy. Fossil fuels (oil, coal, and natural gas) provide most of our energy. There are serious problems associated with these forms of energy from strip mining to oil spills, from acid rain to urban smog and green house gases. These are nonrenewable forms of energy of limited supply and we are using them at an ever increasing rate. Much of our oil is imported from the middle east, placing us in a highly vulnerable position both strategically and economically.

Many wild areas have been sacrificed to energy production and more are under threat from our insatiable appetite for these resources. The degradation of Russia's Siberia and Alaska's Prudoe Bay and Bay of Valdez are well publicized examples but many more slip away with less fanfare. Our personal habits play a major role in all of this.

Activity 1: Renewable Energy Research and Development

Materials:

- "Renewable Energy: Research and Development" Student Handouts, pages 444-446.
- student journals
- World Map, page 447

Duration: 1-2 class periods, possible homework

Location: Classroom

Procedure:
1. Hold a class discussion asking students to identify and list main fossil fuels (oil, coal, and natural gas) that provide most of our energy. How are these resources developed, at what costs/benefits

Procedure continued:
to us and Wilderness? Define and discuss the differences between renewable and nonrenewable sources of energy. Fossil fuels, such as coal, oil, and natural gas, are in limited supply worldwide. Ultimately, countries in the world will have to focus on renewable energy resources. Identify renewable energy sources (hydroelectric power, geothermal energy, wind energy, and solar power).

2. Distribute copies of the "Renewable Energy: Research and Development Student Hand out" and ask students to complete this assignment. Discuss energy consumption patterns around the world. Comparing U.S. consumption to other countries, what conclusions do you draw? What solutions do you have?
3. Assign students to complete the mapping exercise in the "Renewable Energy: Research and Development Student Handout," pages 444-446 plotting renewable energy uses on the world map and analyzing the data.
4. Bring the activity to closure by asking students to keep an energy consumption journal for one week. List types of energy consumption, where the energy comes from, and describe what lifestyle changes they can make to ensure we always have wildlife and wild places.

Evaluation/Follow-up/Extension

- Describe two ways that wildlife and Wilderness might be affected by each of the following electric energy development and uses: hydroelectric dam, nuclear generating plant, coal generating plant, oil generating plant, wind generating plant, tidal generating plant, active or passive solar facility.
- Review the Wilderness Act in the "Wilderness: An Overview" section, pages 46-53 to see how this legislation addresses energy development (gas & oil development, mining) in Wilderness. Write a summary paper citing specific language in the Wilderness Act, what effects this development might have on you, and what alternatives to development might exist.

Career Options: engineer, Wilderness manager, field worker, wildlife biologist, environmental advocate

Activity 2: Flip the Switch for Wildlife

Materials: • Writing and drawing materials

Duration: 1 to 3 class periods

Location: classroom

Procedure:
1. Ask students the question, "What effects, if any, do we have on Wilderness and wildlife when we turn on a light switch?" Let students discuss the question and generate a hypothesis. As a way of

Procedure continued:
testing their hypotheses, assign groups of three or four to research where their electricity comes from, identifying all steps from the light switch back to the land and how they think each step along the way might affect Wilderness and wildlife. Also assign groups to research alternative technologies (solar, geothermal, tidal, wind power, etc.).
2. Ask students from each group to draw and label their "power pathway" on a large sheet of paper. For example, coal would travel from the strip mine or tunnel by truck to the processing plant, then by train to the power plant, over the electric power lines to their house and their light switch. Have students label points along the way where Wilderness and wildlife could be positively or negatively affected.
3. When students have completed their power paths, have them show them to the rest of the class. You can then discuss the following questions with them:

- What kind of effects on Wilderness and wildlife do we have when we turn on a light switch? Are they positive or negative? Can any of them reasonably be changed?
- Which type of fuel source do you think would have the greatest negative impact on Wilderness and wildlife? Which the least? Why? Which the greatest positive impact on Wilderness and wildlife? Why?
- How could we minimize the negative impacts?
- Why don't we use the source of power with the least impact to a greater degree?
- Which energy sources cost the least to develop and use? Which provide more jobs? Which seem to have the least negative overall impact on the environment?
- What trade-offs are involved? Are there any reasonable solutions? If yes, describe some possibilities. With what consequences?
- How can each of us help wildlife and Wilderness through our energy habits?

4. Ask each student to think of at least one constructive thing to do for Wilderness and wildlife that involves energy and its use—and do it!

Credit: Adapted from "Project Wild"

MATH
Stewardship; Resource Conservation

Activity 1: Renewable Energy Research Development

STUDENT HANDOUT

Renewable Energy: Research and Development

Background

Fossil fuels, such as coal, oil and natural gas, are in limited supply worldwide. Ultimately, countries in the world will have to focus more and more on renewable energy resources. The four major renewable resources that are being developed to generate electricity are hydroelectric power, geothermal energy, wind energy, and solar power. Currently, about one-fifth of all the world's energy comes from hydroelectric power, and developing countries are continuing to build renewable energy plants at an ever increasing rate.

Part A

In the space provided on the following page, make pie graphs to compare the current rate of energy consumption in the nations shown. Make a separate graph for each nation using different colored markers for each fuel source.

ENERGY CONSUMPTION IN PERCENT FROM 1987

	OIL	GAS	COAL	NUCLEAR	HYDRO
WORLD	37.9%	20.0%	30.0%	5.3%	6.8%
U.S.	40.9%	23.4%	24.6%	6.8%	4.3%
W. EUROPE	45.0%	15.9%	20.2%	10.7%	8.2%
AFRICA	42.3%	14.2%	35.5%	0.9%	9.1%
(FORMER) USSR	32.6%	37.9%	22.6%	2.9%	4.0%
JAPAN	54.7%	9.6%	18.4%	12.3%	5.0%
CHINA	13.8%	1.8%	80.0%	0.0%	4.4%

© Addison - Wesley Publishing Company, Inc. All Rights Reserved

Activity 1: Renewable Energy Research and Development

STUDENT HANDOUT

Renewable Energy: Research and Development

The size of the circles should be representative of the amount of energy consumed. Place the names under each circle. The size comparisons are as follows:

World—7,789 million tons of oil equivalent (MTOE)
U. S.—1,864 MTOE
W. Europe—1,299 MTOE
Africa—202 MTOE
(Former) USSR—1,363 MTOE
Japan—377 MTOE
China—691 MTOE

The world circle is the largest and should be in the middle.

Analysis

1. What two energy sources currently account for more than 50% of all the energy consumed worldwide? Explain why you think this is the current situation.

2. China is not primarily dependent on oil and gas but relies on coal. Why would China utilize so much more coal than anything else? Why don't they utilize nuclear power?

3. Most countries utilize oil more than any other fuel. How do countries meet their oil needs?

Activity 1: Renewable Energy Research and Development

STUDENT HANDOUT

Renewable Energy: Research and Development Part B

Using a world map, indicate the countries that currently utilize hydroelectric power. Some countries are also using more than one form of renewable energy. Select three different icons (symbols) to plot those countries utilizing geothermal power, wind energy, and solar power. Use the information provided below. Use other maps to help you locate unfamiliar countries.

Hydroelectric power—All countries except Azores, Greenland, Guadaloupe, Hong Kong, and Sierra Leone. The following countries produce very little hydroelectric power: Bhutan, Equatorial Guinea, Guyana, Israel, Netherlands, and Togo.

Geothermal power—China, Germany, Iceland, Italy, Japan, Mexico, New Zealand, Taiwan, Turkey, the former USSR, and the United States.

Wind energy—Australia, Canada, France, Germany, Iceland, Israel, Netherlands, Norway, Spain, Sweden, the former USSR. the United Kingdom, the United States, and Venezuela.

Solar power—Canada, Ethiopia, France, Germany, Israel, Korea, Mexico, Norway, Pakistan, Spain, and the United States.

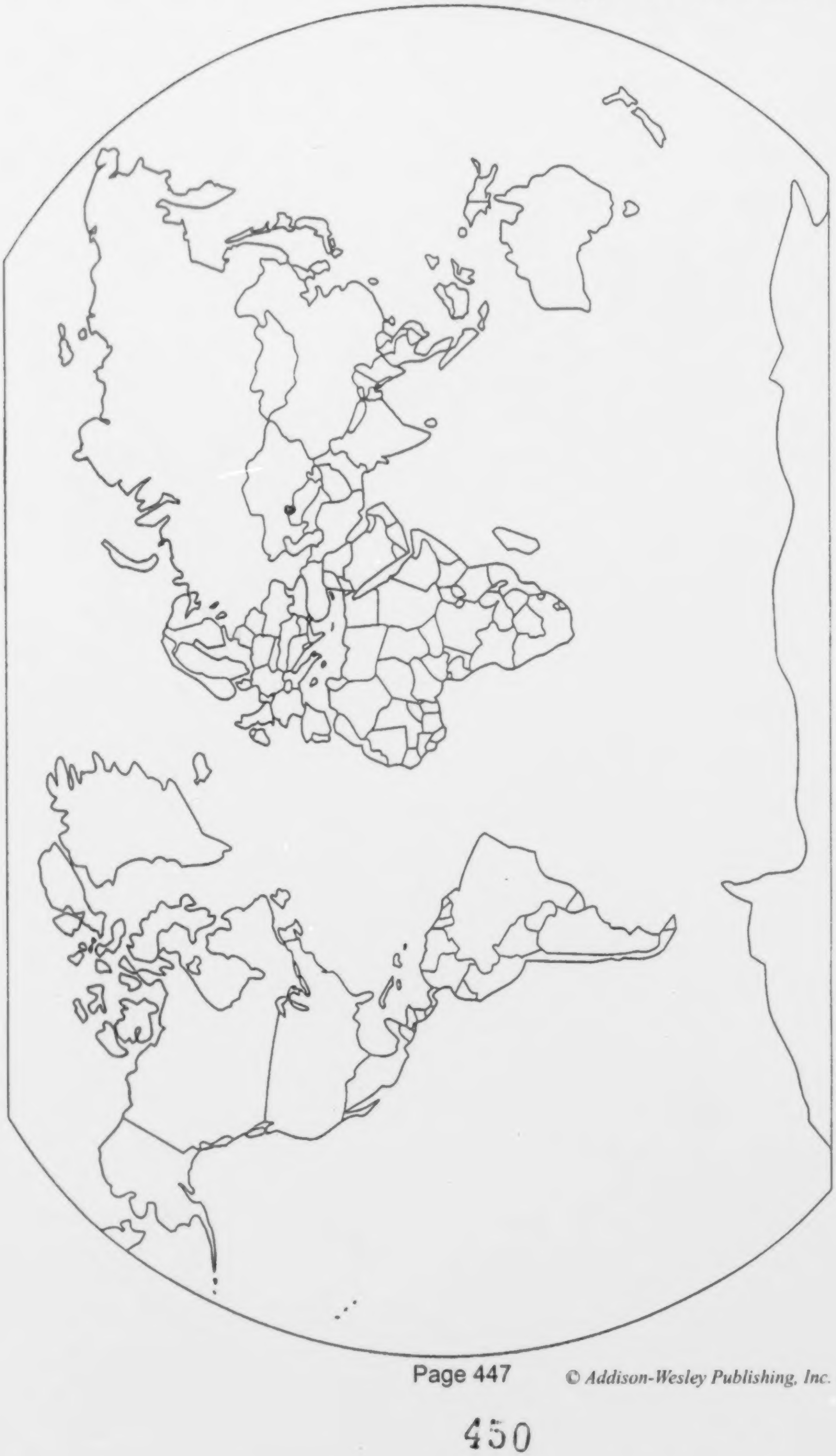
Analysis

1. Why are only some countries using geothermal energy?

2. Most of the developing countries use another type of renewable energy called biomass. The World Energy Conference estimated that in 1987 the total world production of biomass (including fuelwood) was five times greater in the developing world than was produced by the developed world. Why would that be the case?

3. Solar energy is available worldwide but its use is not widespread. Why is it so difficult to produce an adequate, reliable amount of energy from solar power?

©Addison-Wesley Publishing Company, Inc. All Rights Reserved



© Addison-Wesley Publishing, Inc. All Rights Reserved

FURTHER READINGS

& REFERENCES

Natural History

Benedict, Audrey D., *A Sierra Clubs Naturalist's Guide: The Southern Rockies*, The Rocky Mountain regions of Southern Wyoming, Colorado and Northern New Mexico. (San Francisco, CA: Sierra Club Books, 1991).

Chronic, Halka, *Roadside Geology of Colorado,* (Missoula, MT: Mountain Press Publishing 1980, 1992).

Duft, Joseph F and R.K. Mosely, *Alpine Wildflowers of the Rocky Mountains* (Missoula, MT: Mountain Press Publishing, 1989).

Ehrlich, P.L., D. Dobkin, D. Waehye, *Birders Handbook,* (New York: Simon and Schuster Inc., 1988).

Halfpenny, James, *A Field Guide to Mammal Tracking in North America.* (Boulder, CO: Johnson Books, 1986).

Mutel, Cornelia F. and J.C. Emerick, *From Grasslands to Glaciers: The Natural History of Colorado and the Surrounding Region* (Boulder, CO: Johnson Books, 1992).

National Geographic Society, *Field Guide to the Birds of North America* (1987).

Pesman, M. Walter, *Meet the Natives: The Amateur's Field Guide to Rocky Mountain Wildflowers, Trees and Shrubs.* Colorado: Robert Rinehart Publishers, 1975, 1992).

Wassink, Jan, *Birds of the Central Rockies* (Missoula, MT: Mountain Press Publishing, 1991).

Zwinger, Ann H and Beatrice E. Willard, *Land Above the Trees: A Guide to American Alpine Tundra* (Tucson, AZ: University of Arizona Press, 1972).

History

Nash, Roderick, *Wilderness and the American Mind* (New Haven, CT: Yale University Press, 1967).

Robertson, Janet, *The Magnificent Mountain Women Adventures on the Colorado Rockies* (University of Nebraska Press, 1990).

Runte, Alfred, *Public Lands, Public Heritage, The National Forest Idea* (Niwot, CO: Rinehart Publishers, 1991).

Education and Interpretation

Bennett, Christine I., *Comprehensive Multicultural Education: Theory and Practice* (Allyn and Bacon Publishers. 1990).

Cooper, Ann; A. Armstrong; C. Kampert, *The Wild Watch Book: Ideas, Activities and Projects for Exploring Colorado's Front Range.* (Denver, CO: Denver Museum of Natural History, 1990).

Cornell, Joseph, *Sharing Nature with Children* (Nevada City, CA: Dawne Publications, 1979).

Criswell, Susie G., *Nature with Art: Classroom and Outdoor Art Activities with Natural History* (New Jersey: Prentice-Hall Publishers, 1986).

Grant, Carl A. and C.E. Sleeter, *Turning on Learning: Five Approaches for Multicultural Teaching Plans for Race and Class, Gender, and Disability* (1989).

Ham, Sam H., *Environmental Interpretation: A Practical Guide for People with Big Ideas and Small Budgets* (Golden, CO: North American Press, 1992).

Mitchell, Andrew W., *An Usborne Guide: The Young Naturalist.* (Tulsa: OK: EDC Publishing, 1989).

Orr, David W., *Ecological Literacy: Education and the Transition to a Post-Modern World* (New York: State Univ. of New York Press, 1992).

Regnier, Kathleen; Gross, Michael; Zimmerman, Ron, *The Interpreter's Guidebook: Techniques for Programs and Presentations* (Stevens Point: WI: University of Wisconsin, Stevens Point, Foundation Press, Inc., 1992).

Van Matre, Steve and B. Weilder, *The Earth Speaks* (Institute for Earth Education, 1983).

Ecological Philosophy

Anderson, Lorraine, *Sisters of the Earth: Women's Prose and Poetry about Nature.* New York: Vintage Books, 1991).

Cohen, M., *The Pathless Way* (The University of Wisconsin Press, 1984).

Devall, Bill, *Simple in Means, Rich in Ends; Practicing Deep Ecology* (Layton, UT: Gibbs-Smith Books, 1988).

Diamond, I. and G.F. Orenstein, *Reweaving the World: The Emergence of Ecofeminism* (San Francisco, CA: Sierra Club Books, 1990).

Gore, Al, *Earth in Balance: Ecology and the Human Spirit* (Houghton and Mifflin Publishing, 1992).

Leopold, A., *Sand County Almanac* (Oxford University Press, 1949).

Lyon, T.J., "John Muir, the Physiology of the Brain, and the 'Wilderness Experience'". *The Living Wilderness* , Vol. 3, 1974, pp. 25-30.

McKibbin, Bill, *The End of Nature* (New York: Random House, 1989.

McPhee John, *Encounters with the Archdruid* (New York: Farrar, Strauss, Giroux, 1971).

Merchant, Carolyn, *The Death of Nature* (San Francisco, CA: Harper and Row, 1980).

Plant, Judith, *Healing the Wounds: The Promise of Ecofeminism* (Between the Lines Publishers, 1989).

Plant, Judith; C. Plant; V. Andruss, *Home!: A Bioregional Reader* (Santa Cruz, NM: New Society Books, 1990).

Sale, Kirkpatrick, *Dwellers in the Land: The Bioregional Vision* (San Francisco, CA: Sierra Club Books, 1985).

Sessions, George F. and B. Devall, *Deep Ecology: Living As If Nature Mattered* (Layton, UT: Peregrine Smith Books, 1985).

Snyder, Gary 1990. *The Practice of the Wild* (San Francisco, CA: North Point Press, 1990).

Thoreau, H.D., *The Portable Thoreau* (New York: Penguin Books, 1985).

Tobias, Michael (ed.), *Deep Ecology* (San Diego, CA: Avant Books, 1985).

Trimble, Stephen, *Words from the Land* (Salt Lake City, UT: Peregrine Smith Books, 1988).

Van Matre, Steve, *The Earth Speaks* (Warrenville, IL: The Institute for Earth Education, 1983).

Leave No Trace/Wilderness Ethics

Elser, Smoke and B. Brown, *Packin' in on Mules and Horses* (Missoula, MT: Mountain Press Publishing, 1980).

Forgey, William, *Wilderness Medicine.* (Pittsboro, IN: Indiana Camp Supply Books, 1979).

Hampton, Bruce and D. Cole, *Soft Paths: How to enjoy the Wilderness Without Harming It* (Harrisburg, PA" Stackpole Books, 1988).

LaChapelle, E.R., *The ABC of Avalanche Safety* (Seattle, WA: The Mountaineers, 1985).

Litz, Brian and L. Anderson, *Wilderness Ways: The Colorado Outward Bound School Guide for Environmentally Sound Backcountry Travel* (Denver, CO: Colorado Outward Bound School, 1993).

Meyer, Kathleen 1989, *How to Shit in the Woods* (Berkeley, CA: Tenspeed Press, 1989).

Mitchell, Dick, *Mountaineering First Aid: A Guide to Accident Response and First Aid Care* (Seattle, WA: The Mountaineers).

Petzoldt, Paul, *The Wilderness Handbook*, National Outdoor Leadership School, (New York: W.W. Norton & Company, Inc., 1974).

Werner, David, *Where There Is No Doctor* (Palo Alto, CA: The Hesperian Foundation, 1977).

Wilkerson, James A., M.D., *Medicine for Mountaineering* (Seattle, WA: The Mountaineers, 1985).

Natural Resource Management Policy

Clary, D., *Timber and the Forest Service* (University of Kansas Press, 1986).

Ferguson, Denzel and Nancy, *Sacred Cows at the Public Trough* (Bend, OR: Maverick Publications,1983).

Grumbine, R.E., *Ghost Bears: Exploring the Biodiversity Crisis* (Covelo, CA: Island Press, 1992).

Harris, Larry D., *The Fragmented Forest Island Biogeography Theory and the Preservation of Biotic Diversity* (The University of Chicago Press, 1984).

Hendee, John, G. Stankey, and R. Lucas, *Wilderness Management* (International Wilderness Leadership Foundation, 1991).

Reisner, Marc, *Cadillac Desert: The American West and its Disappearing Water* (New York: Penguin Books, 1986)

Sax, Joseph, *Mountains Without Handrails Reflections on the National Parks* (University of Michigan Press, 1980).

Stegner, Wallace, "Our Common Domain," *Sierra* , 1989, Vol. 74, No. 5, pp. 42-47

Stegner, Wallace, *Beyond the Hundredth Meridian: John Wesley Powell and the Second Opening of the West* (New York: Penquin Books, 1953).

Stegner, Wallace, *Where the Bluebird Sings to the Lemonade Springs: Living and Writing in the West* (New York: Penguin Books, 1992).

Wuerthner, George, "Public Lands Grazing: What Benefits at What Cost?" *Western Wildlands*, Vol.15, No. 2, 1989, pp. 24-29.

Wyant, William K., *Westward in Eden: The Public Lands and the Conservation Movement* (Berkeley, CA: University of California Press, 1982).

Stegnar, Wallace, "Our Common Domain," *Sierra*, Vol. 74, No. 5, 1989, pp. 42-47

Wilderness Management, Selected Technical References

Agee, James K. and Darryl R. Johnson (eds.), *Ecosystem Management for Parks and Wilderness.* (Seattle University of WA. Press, 1988).

Cole, David, "Managing Ecological Impacts at Wilderness Campsites: An Evaluation of Techniques," *Journal of Forestry* , Vol. 79, No. 2, 1981, pp. 86-89.

Cole, David and Edward Schreiner, *Impacts of Backcountry Recreation: Site Management and Rehabilitation—An Annotated Bibliography* (USDA FS Gen Tech Rep INT-121, 1981).

Cole, David and Jim Benedict, "Wilderness Campsite Selection—What Should Users Be Told?" *Park Science*, Vol. 3, No. 4, 1983, pp. 5-7.

Cole, David and John Dalle-Molle, *Managing Campfire Impacts in the Backcountry* (USDA FS Gen Tech. Rep INT-135, 1982).

Cole, David, *Ecological Changes on Campsites in the Eagle Cap Wilderness* (USDA FS Res. Paper INT-368, 1986).

Cole, David, *Low-Impact Recreational Practices for Wilderness and Backcountry* (USDA FS Gen Tech Rep INT-265, 1989).

READINGS & REFERENCES

Cole, David, *Wilderness Campsite Monitoring Methods: A Sourcebook* (USDA FS Gen Tech Rep INT-259, 1989).

Douglas, William O. *A Wilderness Bill of Rights*

Drive, B.L., et al, "The ROS planning System: Evolution, Basic Concepts, and Research Needed," *Leisure Sciences,* Vol. 9, No. 3, 1987, pp. 201-212.

Foreman, Dave and H. Wolke, *The Big Outside: A Descriptive Inventory of the Big Wild Areas of the U.S.* (1989).

Freilich, Helen R. (ed.), *Wilderness Benchmark. Proceedings of the National Wilderness Colloquium.* (U.S.D.A.1988).

Hammit, W.E. and D. Cole, *Wildland Recreation: Ecology and Management* (New York: Wiley Interscience, 1987).

Hampton, Bruce and D. Cole,*Soft Paths* (Stackpole Books, 1988).

Hendee, John, G. Stankey, and R. Lucas, *Wilderness Management* (International Wilderness Leadership Foundation, 1991).

Lime, David W. (ed.), *Managing America's Enduring Wilderness Resource* (Minneapolis: U. of Minnesota, 1990).

Lucas, Robert, "The Backcountry Concept: A Positive Viewpoint," *Montana Outdoors.*, Vol. 11, No. 6, 1980, pp. 24-25.

Lucas, Robert (ed.), *Proceedings—National Wilderness Research Conference* (Fort Collins, CO: USDA FS Gen Tech Rep INT-220, 1987).

Stankey, G., et al, *The Limits of Acceptable Change (LAC) System for Wilderness Planning.* (USDA FS Gen Tech Rep Int-176, 1985).

Temple, Kenneth, et al, "Potential Health Hazard from Human Wastes in Wilderness," *Journal of Soil and Water Conservation,* Vol. 37, No. 6, 1982, pp. 357-359.

Washburne, Randel, "Wilderness Recreational Carrying Capacity: Are Numbers Necessary?" *Journal of Forestry,* Vol. 80, No. 11, 1982, pp. 726-728.

Washburne, Randel and D. Cole, *Problems and Practices in Wilderness Management: A Survey of Manages,* (USDA FS Res Pap INT-304,k 1983).

A catalogue of Publications by the Aldo Leopold Wilderness Research Institute is available. Write to: P.O. Box 8089, Missoula, MT 59807

Restoration

Berger, John (ed.), *Environmental Restoration: Science and Strategies For Restoring Earth,* (Island Press, 1990).

Hanbey, Russ, "Restoration: Reading the Landscape", *Clearing,* March/April 1994.

Hanbey, Russ, "Restoration: Defining Our Legacy", *Clearing,* January/February 1994.

Hanbey, Russ, "Repairing the Earth: A Call for Restoration Education", *Clearing,* January/February 1993.

Huges, H.G., *The Society For Ecological Restoration: Proceedings of the 1st Annual Conference, Oakland, California, 1989* (1990).

Kruckenberg, A., *Gardening with Native Plants of the Pacific Northwest* (University of Washington Press).

Leck, Mary Alessio; V. Thomas Parker; and Robert L. Simpson (eds.), *Ecology of Soil Seed Banks* (Academic Press, 1989).

Margolin, Malcolm, *The Earth Manual How to Work on Wild Land Without Taming It* (Berkeley, CA: Heydey Books, 1985).

Marin County Resource Conservation District. 1987. *Ground Work: A Handbook for Erosion Control in North Coastal California*

Project Wild, *Wild School Sites, A Guide to Preparing for Habitat Improvement Projects on School Grounds* (1993).

Rieger, J.P. and B.A. Steele (eds.), *Native Plant Revegetation; Symposium Proceedings, 15 November, 1984.* (California Native Plant Society, San Diego Natural History Museum, 1985).

Stewart, A. W. *Wilderness Protection: a Bibliographic Review* (Monticello, IL: Vance Bibliographies, 1985).

Tufts, Craig, *The Backyard Naturalist* (National Wildlife Federation, 1988).

USDI NPS, *An Evaluation of Experimental Rehabilitation Work,* (Arcata, CA: Redwood National Park. Redwood National Park Watershed Rehabilitation Technical Report Number 19, Redwood National Park, 1987).

W.R. Jordan; M.E. Gilpin; and J.D. Aber, (eds.), *Restoration Ecology: A Synthetic Approach to Ecological Research* (Cambridge University Press. 1987).

Waxman, Don, "Teaching Restoration To Kids", *Whole Earth Review,* Spring 1990.

Tools and Techniques

Hallman, Richard, *Handtools for Trails Work* (Missoula, MT: USDA FS Technical Development Ctr. 1988).

Jackson Albert and David Day, *Tools and How to Use Them* (Knopf, 1978).

Miller, Warren, *Crosscut Saw Manual* (Missoula, MT: USDA FS Techical Development Ctr., 1977).

Mrkich, Dale and Jerry Oltman, *Hand Drilling and Breaking Rock for Wilderness Trail Maintenance* (Missoula, MT: USDA FS Techical Development Ctr., 1984).

Proudman, Robert, *AMC Field Guide to Trail Building and Maintenance* (Appalachian Mountain Club, 1977).

Sloane, Eric, *A Museum of Early American Tools* (Ballantine Books, 1964).

Tompkins, Peter and C. Bird, *The Secrets of the Soil: New Age Solutions For Restoring Our Planet* (New York: Harper and Row, 1989).

USDA FS, *Techniques and Equipment for Horse Travel.* (Missoula, MT: USDA FS Techical Development Ctr., 1988).

Environmental Literature and General Interest

Abbey, Edward, *Desert Solitaire* (McGraw-Hill, 1968).

Dillard, Annie, *Pilgrim at Tinker Creek* (Harper and Row, 1974).

Halper, John, *Gary Snyder - Dimensions of A Life* (San Francisco, CA: Sierra Club Books, 1991).

McPhee, John, *Encounters with the Archdruid.*

Neihardt, John, *Black Elk Speaks*

Nabhan, Gary P, *The Desert Smells Like Rain: A Naturalist in Papgo Indian Country* (San Francisco, CA: North Point Press, 1985).

Olson, Sigurd, *The Singing Wilderness* (New York: Knopf Publishers, 1956).

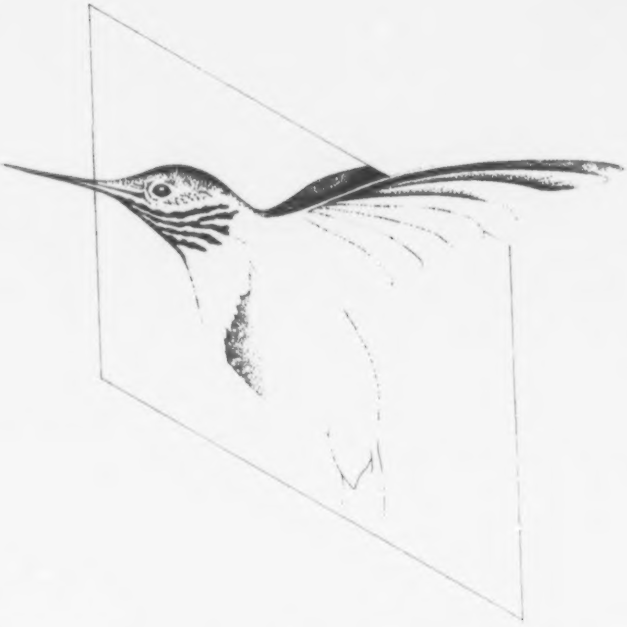
Stegner Wallace, *Angle of Repose* (New York: Ballantine Books, 1971).

Snyder, Gary, *No Nature: New and Selected Poems* (New York: Pantheon Books, 1992).

Snyder, Gary, *Rip Rap and Cold Mountain Poems* (1965); *Mountains and Rivers Without End* (1965); *Earth Household* (1957); *Turtle Island* (1969).

READINGS & REFERENCES

Wilkinson, Charles F., *The Eagle Bird: Mapping a New West* (New York:Vintage Books, 1992).
Wilkinson, Charles F., *Crossing the Next Meridian* (New York: Vintage Books, 1991).
Wilkinson, Charles F., *The American West - A Narrative Bibliography and a Study in Regionalism* (Niwot, CO: University Press of Colorado, 1989).
Williams, Terry Tempest, *Pieces of White Shell: A Journey to Navajoland* (Albuquerque, NM: University of New Mexico Press, 1983).
Williams, Terry Tempest, *Refuge: An Unnatural History of Family and Place.* (New York: Vintage Books, 1992).
Zwinger, Ann, *Beyond the Aspen Grove* (Tucson, AZ: University of Arizona Press, 1970).



GLOSSARY OF TERMS

GLOSSARY OF TERMS

abiotic - A non-living factor in an ecosystem (e.g. air, sunlight, water).

acclimation - Alteration of physiological rate or other capacity to perform a function through long-term exposure to certain conditions.

acclimatization - Changes or differences in physiological state that appear after exposure to different natural environments.

acid rain - Precipitation with an extremely low PH. It is brought about by a combination of water vapor in the atmosphere with hydrogen sulfide and nitrous oxide vapors released to the atmosphere from the burning of fossil fuels. The result is a sulfuric and nitric acid in rain, fog and snow.

adaptation - Genetically determined characteristic (behavioral, morphological, physiological) that improves an organism's ability to survive and successfully reproduce under prevailing environmental conditions.

ancient forest - The late successional stages of forest development. Synonymous with old-growth forest. Characterized by large trees, a broken, uneven canopy, numerous snags, fallen logs, high biomass.

anthropocentrism - A view of life and the world that places humans above all other species in value and importance.

association - Natural unit of vegetation characterized by a relatively uniform species composition and often dominated by a particular species.

biodiversity - The range of different species - microbial, insect, plant and animal - which exist in any given area. Areas of high biodiversity contain many different genetic species. Areas of highest biodeversity typically occur in tropical forests.

biological diversity - The diversity of living things (species) and of life patterns and processes ecosystem structures and functions). Includes genetic diversity, species and population diversity, ecosystem diversity, landscape and regional diversity, and biosphere diversity.

biomass - Weight of living material, usually expressed as dry weight per unit of area.

biome - Major regional ecological community of plants and animals; usually corresponds to plant ecologists and European ecologists' classification of plant formations and classification of life zones.

biosphere - Thin layer about Earth in which all living organisms exist.

biotic community - Contains all living organisms within our ecosystem.

bog - Wetland ecosystem characterized by an accumulation of peat, acid conditions, and dominance of sphagnum mosses.

boreal forest - Needle-shaped evergreen or coniferous forest bordering subpolar regions; also called taiga.

bottleneck - An evolutionary term for any stressful situation that greatly reduces a population.

browse - Part of current leaf and twig growth of shrubs, woody vines, and trees available for animal consumption.

carnivore - Organism that feeds on animal tissue; taxonomically, a member of the order Carnivorea (Mammalia).

carrying capacity - Number of individual organisms that the resources of a given area can support, usually through the most unfavorable period of the year.

GLOSSARY OF TERMS

clearcutting - A logging method by which an entire forest stand is cut down. In national forests, the size of an individual clearcut cannot exceed 40 acres.

climax - *State and community of succession that is capable of self-perpetuation under* prevailing environmental conditions.

coevolution - Joint evolution of two or more noninterbreeding species that have a close ecological relationship; through reciprocal selective pressures the evolution of one species in the relationship is partially dependent on the evolution of the other.

coexistence - Two or more species living together in the same habitat, usually with some form of competitive interaction.

community - Group of interacting plants and animals inhabiting a given area.

competition - Any interaction that is mutually detrimental to both participants; occurs between species that share limited resources.

commons - Large areas of joint-use land with social control resting in the hands of local communities and standards of use built on intimate knowledge of plants, animals, and ecosystems. Most commons were destroyed with the advent of industrial civilization, but some still exist in less developed parts of the world.

conservation - As originally coined by Gifford Pinchot, the development of natural resources for "the greatest good for the greatest number [of humans] over the longest period of time." Aldo Leopold defined conservation as "a state of harmony between people and land."

conservation biology - The field of biology that studies the dynamics of diversity, scarcity, and extinction.

continuum - Gradient of environmental characteristics or changes in community composition.

deciduous - (of leaves) Shed during a certain season (winter in temperate regions; dry seasons in the tropics); (of trees) having deciduous parts.

decomposer - Organism that obtains energy from the breakdown of dead organic matter to more simple substances; most precisely refers to bacteria and fungi.

deme - Local populations or interbreeding group within a larger population.

detritus - Fresh to partly decomposed plant and animal matter.

disturbance - In ecosystems, an event that interrupts succession, eliminates some part of the existing plant and animal community, and creates conditions for renewed growth and colonization. Examples are wildfire, windstorm, flooding, insect outbreaks, etc.

diversity - Abundance in number of species in a given location.

dominance - (Ecological) Control within a community over environmental conditions influencing associated species by one or several species, plant or animal, enforced by number, density, or growth form; (social) behavioral, hierarchical order in a population that gives high-ranking individuals priority of access to essential requirements; (genetic) ability of an allele to mask the expression of an alternative form of the same gene in a heterozygous condition.

dominant - Population possessing ecological dominance in a given community and thereby governing type and abundance of other species in the community.

dormant - State of cessation of growth and suspended biological activity during which life is maintained.

ecological efficiency - Percentage of biomass produced by one trophic level that is incorporated into biomass of the next highest trophic level.

ecosystem - A community of species and its physical environment. When defined at different levels, it often involves arbitrary boundaries. An ecosystem may refer to anything from a fallen log to an entire watershed.

ecosystem management - Any land-management system that seeks to protect viable populations of all native species, perpetuate natural-disturbance regimes on the regional scale, adopt a planning time line of centuries, and allow human use at levels that do not result in long-term degradation.

ecotone - Transitional zone between two structurally different communities; often termed "edge".

ecotype - Subspecies or race adapted to a particular set of environmental conditions.

edge - Place where two or more vegetation types meet.

edge effect - Response of organisms, animals, in particular, to environmental conditions created by the edge.

endangered - A legal classification of the federal Endangered Species Act under which a species is at risk of becoming extinct throughout all or a significant portion of its range.

endemic - Restricted to a given region.

energy - The capacity to do work.

entropy - Transformation of matter and energy to a more random, more disorganized state.

environment - Total surroundings of an organism, including other plants and animals and embracing those of its own kind.

eutrophic - Term applied to a body of water with high nutrient content and high productivity.

eutrophication - Sum of the loss of moisture by evaporation from land and water surfaces and by transpiration from plants.

evolution - Change in gene frequency through time resulting from natural selection and producing cumulative changes in characteristics of a population.

food chain - Movement of energy and nutrients from one feeding group of organisms to another in a series that begins with plants and ends with carnivores, detrital feeders, and decomposers.

food web - Interlocking pattern formed by a series of interconnecting food chains.

forb - Herbaceous plant other than grass, sedge, or rush.

forest plan - The comprehensive land-management plan required of each national forest under the National Forest Management Act.

gap analysis - A method of identifying important areas of biodiversity that remain unprotected.

gene - Unit material of inheritance; more specifically, a small unit of DNA molecule coded for a specific protein to produce one of the many attributes of a species.

global warming - The warming of the Earth resulting from the greenhouse effect.

greenhouse effect - Selective energy absorption by carbon dioxide in the atmosphere that allows short wavelength energy to pass through but absorbs longer wavelengths and reflects heat back to Earth.

habitat - An area that has the minimum required arrangement of food, water, shelter, and space for a particular species.

habitat fragmentation - Destruction of habitat through loss of functional habitat and the isolation of the remaining patches within an ecosystem.

herbivore - Organism that feeds on plant tissue.

GLOSSARY OF TERMS

hibernation - Winter dormancy in animals characterized by a great decrease in metabolism.

immigration - Arrival of new individuals into a habitat or population.

keystone species - A species that plays a role in an ecosystem that far outweighs the role of other species.

Krumbholz - Stunted form of trees characteristic of transition zone between alpine tundra and subalpine coniferous forest.

life zone - Major area of plant and animal life equivalent to a biome; transcontinental region or belt characterized by particular plants and animals and distinguished by temperature differences; applies best to mountainous regions where temperature changes accompany changes in altitude.

marsh - Wetland dominated by grassy vegetation such as cattails and sedges.

mesic - Moderately moist habitat.

microclimate - Climate on a very local scale that differs from the general climate of the area; influences the presence and distribution of organisms.

migration - Intentional, directional usually seasonal movement of animals between two regions or habitats; involves departure and return of the same individual; a round-trip movement.

mutualism - Relationship between two species in which both benefit.

natural selection - Differential reproduction and survival of individuals that result in elimination of maladaptive traits from a population.

niche - Functional role of a species in the community, including activities and relationships.

omnivore - Animal that feeds on both plant and animal matter.

opportunistic species - Organisms able to exploit temporary habitats or conditions

parasite - An organism living in or on another organism (the host) from which it obtains its nutrients. Parasites usually harm their hosts to some degree.

peat - Unconsolidated material consisting of undecomposed and only slightly decomposed organic matter under conditions of excessive moisture.

perturbation - Another word for disturbance; borrowed from physics to suggest an event that alters the state of or direction of change in a system.

photosynthesis - Synthesis of carbohydrates from carbon dioxide and water by chlorophyll using light as energy and releasing oxygen as a by-product.

predation - Act of one living organism consuming another living organism.

primary succession - Vegetation development starting from a new site never before colonized by life.

production - Amount of energy formed by an individual, population, or community per unit of time.

resource - Environmental component utilized by a living organism.

richness - Component of species diversity; the number of species present in an area.

riparian - Along banks of rivers and streams; river bank forests are often called gallery forests.

seral - Series of stages that follow one another in succession.

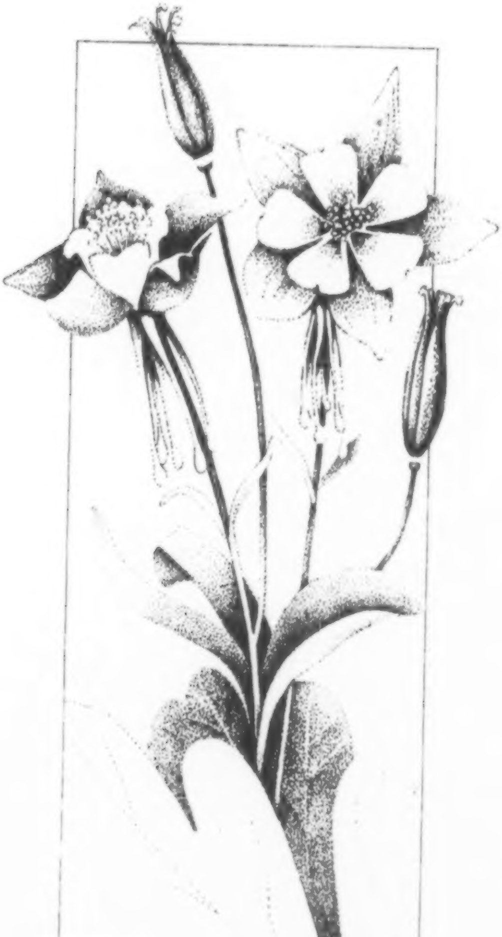
species diversity - The variety of species inhabiting an area.

stability - Ability of a system to resist change or to recover rapidly after a disturbance; absence of fluctuations in a population.

stand - Unit of vegetation that is essentially homogenous in all layers and differs from adjacent types qualitatively and quantitatively.

stochastic - Patterns arising from random factors.
succession - Replacement of one community by another; often progresses to a stable terminal community called the climax.
sustainable - Describes levels of human use that allow ecosystems to retain their basic structure and function over the long term.
symbiosis - Living together of two or more species.
territory - Area defined by an animal; varies among animals according to social behavior, social organization, and resource requirements of different species.
threatened - Legal classification under the Endangered Species Act that describes a species as likely to become endangered in the foreseeable future.
transpiration - Loss of water vapor by land plants.
tundra - Areas in arctic and alpine (high mountain) regions characterized by bare ground, absence of trees, and growth of mosses, lichens, sedges, forbs, and low shrubs.
viable population - A population that stands an excellent chance of surviving with minimal human management.
watershed - Entire region drained by a waterway that empties into a lake or reservoir; total area above a given point on a stream that contributes water to the flow at that point; the topographic dividing line from which surface streams flow in two different directions.
wilderness - Refers to any wildlands other than Congressionally designated Wilderness.
Wilderness - Only refers to Congressionally designated Wilderness - those areas set aside in the National Wilderness Preservation System for the use and enjoyment of the American people as wilderness. In these areas development and human presence are kept to a minimum and natural processes prevail.

APPENDICES



APPENDIX A

Materials Referenced to Lessons in...

THE SECONDARY WILDERNESS & LAND ETHIC BOX

Box Item	Subject / Strand	Lesson
BOOKS		
• A Sand County Almanac	Science / Overview	L2, A1, Eval.
• Keepers of the Earth, Teacher's Guide	History / Stewardship	L9, A2
• Ansel Adams: Our National Parks	History / Aesthetics	L3, A1, Extens
	The Arts / Perspectives	L4, A1
• Words for the Wild-Trailside Reader	History / Aesthetics	L2. A1
	P.E & Health / Field Exp.	L1, A2
• Naturalist Guide to the Southern Rockies*	English / Aesthetics	L4, A2
	The Arts / Perspectives	L4, Extensions
• The First Ranger	SS / Stewardship	L11, A2
• Conserving Greater Yellowstone	Science / Connections	L4, Extensions
• Soft Paths Book	P.E. & Health / Field Exp.	L1, A1-2
• NOLS Cookery	Math / LNT	L4, A3
	P.E. & Health / Field Exp.	L1, A2
• The Wilderness Ranger Cookbook	Math / LNT	L4, A3
	P.E. & Health / Field Exp.	L1, A2
• The First 75 Years, Preserving Our Past for the Future, National Park Service	History / Aesthetics	L2, A1
• Women in Natural Resources	History / Aesthetics	L2, A1
• The Backcountry Classroom,	Math / LNT	L4, A3, Ref.
Lessons for Teaching in Wilderness	P.E. & Health / Field Exp.	L1, A1
• The Land is Sacred, Teacher's Guide	SS / Perspectives	L5, A2
	History / Stewardship	L9, A1-2
• Wilderness Quotes Book	P.E & Health / Field Exp.	L1, A2
• Centennial Mini-Histories of the Forest Service	History / Aesthetics	L2, A1
• Conservation Biology Curriculum for High School Students, Teacher's Manual	Science / Connections	L4, Extensions
• Conservation Biology Curriculum for High School Students, Student Workbook	Science / Connections	L4, Extensions
POSTERS		
• LNT Poster	SS / Stewardship	L10, A1
MAPS		
• National Forest Map	SS / Connections	L7, A1
• USFS National Map		
• USFS Regional Map*	SS / Overview	L2, A1

APPENDIX A

Box Item	Subject / Strand	Lesson
MAPS (Continued)		
• NWPS Wilderness Map	SS / Overview	L2, A1
	SS / Overview	L9, A1
	SS / Field Exp.	L13, A1
	History / Overview	L1, A2-3
	Science / Overview	L1, A1
	Science / Connections	L4, A1
	Science / Ecology	L5, A4
	Math / Overview	L1, A2-3
• State Wilderness Map, Mission Mountains Wilderness*	SS / Connections	L7, A1
	SS / Ecology	L6, A3
	Math / Ecology	L2, A1
• Trails Illustrated Topo. Maps, Glacier National Park, Waterton Lakes National Park*	SS / Ecology	L6, A1-2
	SS / Connections	L7, A1
	Math / Ecology	L2, A1
AUDIO-VISUAL MATERIALS		
• Soft Paths Video	SS / Connections	L9, A4
	P.E. & Health / Field Exp.	L1, A1-2
• All Things Are Connected Video	SS / Perspectives	L5, A2
	History / Stewardship	L9, A1
• The Man Who Planted Trees Video	SS / Stewardship	L11, A2
• The American Experience: Battle for Wilderness Video	History / Aesthetics	L2, A1
	History / Perspectives	L7, A1
	P.E. & Health / Field Exp.	L1, A1
• The Last Parable Video	The Arts / Aesthetics	L1, A1
• Wild By Law Video	History / Aesthetics	L2, A1
	English / Overview	L1, A1
	P.E. & Health / Field Exp.	L1, A1
• An Act of Contrition Video	History / Aesthetics	L3, A1
• Wilderness and the Imagination Video	The Arts / Aesthetics	L1, A2
• Visions of the Wild Video	SS / Perspectives	L5, A1
• Payne's World Video and Teacher's Guide	Science / Connections	L6, A1
• Grand Canyon Suite tape	The Arts / Aesthetics	L2, A2
• Canyon by Paul Winter tape	The Arts / Aesthetics	L2, A2
• Narada, The Wilderness Collection tape	The Arts / Aesthetics	L2, A2
• Planet Drum, by Mickey Hart tape	The Arts / Aesthetics	L2, A2
• Axel F on "Beverly Hills Cop" Soundtrack	The Arts / Aesthetics	L3, A2
• The Four Seasons by Vilvaldi tape	The Arts / Aesthetics	L3, A3
• NWPS slide show	Science / Overview	L1, A1
• Landscape Art Slides	The Arts / Perspectives	L4, A1
• Historical Photographs	History / Aesthetics	L3, A1
• Handtools for Trail Work Laminated Cards	History / Aesthetics	L4, A1

APPENDIX A

Box Item	**Subject / Strand**	**Lesson**
MISCELLANEOUS		
• Oh Wilderness! Game	P.E. & Health / Field Exp.	L1, A2, Eval.
• Laminated Wilderness Act Cards	English / Overview	L1, A1
• Contour Stereogram Book	Science / Ecology	L5, A1
• Stereoscope	Science / Ecology	L5, A1
CURRICULA & PAMPHLETS		
• LNT Outdoors Skills & Ethics booklet	P.E. & Health / Field Exp.	L1, A1
	P.E. & Health / Field Exp.	L2, A1-2
• Sample Brochures	SS / Aesthetics	L3, A2

L = Lesson

A = Activity

*Denotes regional specific box items

APPENDIX B

Vendor List for Secondary Wilderness & Land Ethics Box

BOOKS

VENDOR:
Ingram Book Company
1125 Heil Quaker Blvd
Lavergne, TN 37086-3650
1-800-937-5300, Ext. 6612 or FAX 1-800-876-0186
NOTE: $500.00 minimum order. If you FAX the order, you will be given 40-41% discount and no shipping; if you call in the order, you will be given 38% discount, plus shipping

MATERIALS
- A Sand County Almanac by Aldo Leopold ($9.95)
- Keepers of the Earth, Teacher's Guide ($9.95)
- Ansel Adams: Our National Parks ($18.95)

VENDOR:
Sierra Club Books
85 2nd St.
San Francisco, CA 94105
Phone: 415) 977-5500

MATERIALS:
- Words for the Wild-Sierra Club Trailside Reader ($12.00)
- Naturalist Guide to the Southern Rockies - Sierra Club ($18.00)

NOTE: Discounts with bulk orders

VENDOR:
Fact & Fiction Book Store
216 West Main
Missoula, MT 59802
Phone: 1-800-769-7323

MATERIALS:
- The First Ranger by C.W. Guthrie ($14.95)
- A Sand County Almanac by Aldo Leopold ($9.95)
- Keepers of the Earth, Teacher's Guide ($9.95)
- Ansel Adams: Our National Parks ($18.95)

VENDOR:
Northern Rockies Conservation Cooperative
P.O. Box 2705
Jackson, WY 83001
(307) 733-6856

MATERIALS:
- Conserving Greater Yellowstone - A Teacher's Guide ($10.00)

VENDOR:
Leave No Trace, Inc.
P.O. Box 18
Lander, WY 82520
(307) 332-4784 or 307-332-6973 or 1-800-332-4100 (hotline)

MATERIALS:
- Soft Paths video ($19.95)
- Soft Paths Book by Hampton & Cole ($14.95)
- NOLS Cookery ($8.95)
- LNT Outdoors Skills & Ethics booklet
- LNT Poster ($2.00)

VENDOR:
National Park Service, 1-800-821-2903

MATERIALS:
- The First 75 Years, Preserving Our Past for the Future, NPS ($2.00)

VENDOR:
WINR, Bowers Lab
University of Idaho
Moscow, ID 83843
208-885-6754

MATERIALS:
- Women in Natural Resources, Vol 11, No.3 ($6.00)

APPENDIX B

Vendor List for Secondary Wilderness & Land Ethics Box (continued)

VENDOR:
ICS Books, Inc.
One Tower Plaza
107 E. 89th Avenue
Merrillville, IN 46410
Phone: 1-800-541-7323

MATERIALS:
- The Backcountry Classroom, Lessons for Teaching in Wilderness ($29.95 + $3.00 shipping)

NOTE: 40% discount for more than 5 titles; or 45-50% discount for a case (50 books)

VENDOR:
Environmental Media
P.O. Box 1016
Chapel Hill, NC 27514
1-800-368-3382

MATERIALS:
- The Land is Sacred, Teacher's Guide, Order # AT102 ($4.95)
- All Things Are Connected" video, Order # AT101 ($19.95)

VENDOR
Arthur Carhart National wilderness Training Center
20325 Remount Road
Huson, MT 59846

MATERIALS:
- Wilderness Quotes Book ($6.00)
- NWPS slide show (call for masters to be duplicated) (Estimate:69 slides x .75 = $51.75)
- Historical Photographs (to be duplicated & laminated) (Price: ???, Est. $10.00)

VENDOR:
U.S. Forest Service

MATERIALS:
- Centennial Mini-Histories of the Forest Service, Free from Washington Office, 202-205-0957
- Handtools for Trail Work (Technology & Development Program) Free from Missoula Technology & Development Center, 406-329-3900
- USFS National Map, free
- USFS Regional Map, free
- U.S. Wilderness Map or Regional Wilderness Map, $4.00

VENDOR:
Kendall-Hunt Publishers
1-800-258-5622

MATERIALS:
- Conservation Biology Curriculum for High School Students, Teacher's Manual ($49.90)
- Student Workbook: ($13.90) + $4.00 shipping

VENDOR:
Falcon Catalog, P.O. Box 1718, Helena, MT
1-800-582-2665 or FAX 406-442-2995

MATERIALS:
- The Wilderness Ranger Cookbook, $7.95 plus shipping

VIDEOS

VENDOR:
The Video Project
200 Estates Drive
Ben Lomond, CA 95005
1-800-4-PLANET or (408) 336-0160

MATERIALS:
- The Man Who Planted Trees, Order MAN-054-N ($95.00)

APPENDIX B

Vendor List for Secondary Wilderness & Land Ethics Box (continued)

VENDOR:
Direct Cinema Limited
P.O. Box 10003
Santa Monica, CA 90410
1-800-525-0000

MATERIALS:
- The American Experience: Battle for Wilderness ($50.00 + shipping)
- Wild By Law ($50.00 + shipping)

NOTE: Contact Joan von Herrmann for project discount

VENDOR:
MT. Department of Fish, Wildlife, & Parks
930 Custer Ave. W
Helena, MT 59620
(406) 444-2733

MATERIALS:
- The Last Parable ($34.95)

VENDOR:
U.S. Forest Service

MATERIALS:
- An Act of Contrition / Wilderness and the Imagination, Duplication Charge (est $10.00)
- Visions of the Wild, Duplication Charge (est. $10.00)

VENDOR:
U.S. Forest Service, Pacific Southwest Region
900 W. Grand
Pourterville, California 93257
209-784-1500

MATERIALS:
- Payne's World Video and Teacher's Guide, Duplication Charge (est. $10.00)

AUDIO TAPES

VENDOR:
Rockin' Rudy's or you can order from your local music store
237 Blaine
Missoula, MT 58901
Phone: 406-542-0077

MATERIALS:
- Grand Canyon Suite by Ferde Grofe ($3.99)
- Canyon by Paul Winter ($9.99)
- Narada, The Wilderness Collection ($10.99)
- Planet Drum, by Mickey Hart ($9.99)
- Axel F on "Beverly Hills Cop" Soundtrack by Harold Faltermeyer ($9.99)
- The Four Seasons by Antonio Vivaldi ($9.99)

OTHER MATERIALS

VENDOR:
Ampersand Press
Port Townsend, WA
Contact Terry Manning for discount prices

MATERIALS:
- Oh Wilderness! Game (Retail: $9.95 + 3.50 shipping)

Note: Discounts for bulk orders, contact Terry Manning

VENDOR: (Slides)
The Cleveland Museum of Art
11150 East Boulevard
Cleveland, Ohio 44106
Phone: 216-421-7340

MATERIALS:
1 Slide: "Twilight in Wilderness", Frederic E. Church. ($4.00 + $1.50 shipping)

APPENDIX B

Vendor List for Secondary Wilderness & Land Ethics Box (continued)

VENDOR:
Sandak
180 Harvard Avenue
Stamford, Connecticut 06902
Phone: 203-967-2745

MATERIALS: Slides

1 Slide: "Edge of the Forest", Asher B. Durand

1 Slide: "The Oxbow", Thomas Cole

1 Slide: "Fur Traders Descending the Missouri", George Caleb Bingham

1 Slide: "The Rocky Mountains, Landers Peak", Albert Bierstadt

1 Slide: "Max Schmitt in a Single Scull", Thomas Eakins

1 Slide: "Teton Range, Snake River, Ansel Adams

1 Slide: "Evening Star, III, Georgia O'Keeffee

1 Slide: "Sunrise, No 3", Arthur Dove

1 Slide: "Amarillo Ramp, shale", Robert Smithson

1 Slide: "Running Fence", Christo

Individual Slide Prices:
1-49 Slides = $3.50
50-499 Slides = $3.00
Shipping: Orders up to $70.00 = $3.50

VENDOR:
Frey Scientific
P.O. Box 8101
905 Hickory Lane
Mansfield, OH 44901-8101
1-800-225-3739

MATERIALS:

- Contour Stereogram Book ($5.50), Order F05269
- Stereoscope ($4.55), Order # F05264

VENDOR:
Trails Illustrated
P.O. Box 3610
Evergreen, CO 80439-3425
1-800-962-1643

MATERIALS:

- 3 Topographic maps of wilderness areas ($8.99 each), 50% discount if you mention it is for wilderness education purposes ($13.50 + shipping)

VENDOR:
Office Supply Store

MATERIALS:

- Accordion folder for maps, brochures, etc. ($5.43)

VENDOR:
Local Merchants

MATERIALS:

- Large Rubbermaid Tote for box container ($14.84)
- Small Rubbermaid Tote for videos & audio tapes, stereoscope & guide ($3.50 total, approx.)

Estimated cost for box = $737.20